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The Engineer and the Scientist

THE scientist of to-day differs, typically, from his predecessor of the last century in the comparative humility of his approach towards physical problems. His readiness to acknowledge the relative character of scientific truths—one being often but a stepping-stone to another with which it may be incompatible—keeps him alive to the possibilities of more discoveries and spurs him on to further efforts.

Therein he is unlike the engineer, who must accept definite theories as working hypotheses. Not for the engineer is the luxury of philosophic doubt; it is his business to give practical expression to the concepts of the scientist.

But the engineer and the scientist have this in common: working together they have built up the material base upon which our civilisation rests. It is a work of which they might excusably feel proud. Yet it is evident that both the partners are becoming disillusioned regarding their powers to improve the conditions of life, and bitterly disappointed with the effect of their labours on the welfare of the world.

Sir Alfred Ewing, this year's president of the British Association, used the opportunity provided by the meeting at York for bringing scientists and laymen together to utter a warning lest the gifts of the discoverer and the inventor should be used not to develop civilisation but to destroy it, by the creation of more destructive weapons of slaughter and by the production through drudgery of commodities which many of those who produce them cannot afford to buy.

In this he is seconded by Professor Miles Walker in his address as president of the Engineering Section. While Sir Alfred calls for the application of the dispassionate temper of science to the difficulties of the hour, Dr. Walker would like the control of affairs handed over to engineers or "engineeringly minded" (*i.e.*, logical) people.

It is probably true that if the political or consuming side of the world were organised with the same ability and logical sense as the producing branch, many of our worst troubles would disappear. But we are not at all sure that those who control productive methods so efficiently would be the best to organise consumption. Indeed, the adoption of the same kind of efficiency in both cases might not result in the happiest conditions.

Dr. Walker is probably on surer ground when he criticises our educational methods. Vocational training, with the definite object of making good producers, has proved very effective, but general education has failed in what should be its purpose of making good consumers. To wait for the world to become worthy of its engineers and scientists will be weary work and fraught with dangers, and we see no desirable short cuts.

But we share Sir Alfred Ewing's faith that if the world falls in ruins about its inhabitants, it will not be on account of the too fruitful activities of the engineer.

The First New J.E.A. Station

THE present trend in electricity supply is well illustrated in the construction of Ironbridge power station by the West Midlands Joint Electricity Authority, which has virtually pooled the extensions of plant for Ocker Hill, Walsall, West Bromwich, and Wolverhampton. The J.E.A. has already done more, for it has begun an extensive rural supply scheme; it has also interconnected these four stations to enable the most efficient plant to be operated in three of them and to allow West Bromwich to be closed down. Instead of the 10,000-kW sets, which would probably have been the largest size installed individually, it was originally planned to put in 25,000-kW sets at Ironbridge. Then the Central Electricity Board decided that the site was good enough for a 200,000-kW station, and called for four 50,000-kW sets, which again brought about a reduction in capital expenditure per kW and also an anticipated lessening of running costs. As Ironbridge is to be a base-load station, and will not have to deal with fluctuating loads, Mr. Hetherington has had simplicity of operation as his aim in designing the station. There are

many novel features incorporated in it, but, these apart, the lay-out is a sound engineering job, from which much may be learned.

The Suggested Club

THE discussion of the proposal to establish an Electrical Club in London continues in our "Correspondence" pages. This week reference is made to the non-success of the Engineers' Club in Coventry Street. Most engineers know the story, and many regret the failure. It was suffocated by the sheer weight of the financial burden. Must it follow, however, that no alternative can be found to satisfy the need which has so frequently been expressed in our pages for some common electrical meeting-place where men from the provinces or overseas or different parts of the metropolis may expect to run across kindred spirits? We have associations, institutions, and numerous clubs of a general character which might afford facilities which, in effect, would constitute a more or less simple sort of specialised rendezvous. In the past certain London hotels were known as the mid-day haunts of electrical circles. Revival of the engineering industry might make many things possible that have not been so in recent years. Let us not dismiss the matter hastily merely because the Engineers' Club had to shut its doors.

From Cradle to Grave

WITH what wonderful solicitude electricity encircles us with its kindly influence right from the beginning to the end! We may not all have to pass the delicate premature stages of our career swathed in the comfort of an electric incubator, but long before we know it our food may be warmed electrically while we are bathed in electrically heated water for subsequent exposure in all our sweet simplicity to the rays of artificial sunlight (when there is no other). In a hundred ways electricity comes to the aid of the doctor and the nurse in imparting health and vigour throughout the entire seven ages of man, and if, escaping Sing Sing, we so desire, we may have the satisfaction of being centrally heated seven times hotter in an electric furnace at a crematorium. Then follows the more prosaic chapter which Brighton has brought to our notice. Famous in so many ways, Brighton is enriching its record by heating its cemetery chapels—tubular under the few seats and by radiators in the vestries—so that mourners may not be unduly hurried down the inevitable slope. Strange what things pass our notice in the hurry of electrical progress! How many illuminating engineers or contractors have ever noted that few cemetery chapels have artificial lighting.

A Successful Exhibition

LAST week's National Radio Exhibition at Olympia is officially described as the largest and most successful of any held since the inauguration of this annual event ten years ago. The attendance was better than had been anticipated by its organisers, and an atmosphere of cheerful optimism prevailed among the salesmen. As the result all the exhibitors are anticipating and predicting a considerable volume of new business, and each hopes to increase his turnover materially this season, which will be a month longer than the last, since the Show opened just four weeks earlier than usual. Manufacturers have allowed traders ample opportunity of becoming acquainted with their new lines, and there is nothing more to be disclosed. Dealers can, therefore, now go ahead with confidence.

Lighting in Mines

GOVERNMENT officials have acquired a reputation for being aloof from human needs and practical exigences, but those with whom we have come into contact over electrical matters impart the impression of readiness to give a broad-minded consideration to the views of the man on the spot. In the latest report of the Mines Department, reference is made to the co-operation between the Department and the special Lighting Committee of the Institution of Mining Electrical Engineers and other interested bodies to secure improvement in the lighting of collieries. The Department holds that by waiting a little higher standards may be fixed, voluntarily, and the view of Sir Henry Walker, the chief inspector, is that the means of improvement now available, if adopted as they should be, would go far to reduce the number of accidents and also the incidence of miners' nystagmus. While every opportunity is to be allowed the mining industry to put its house in order the possibility of external compulsion is not ruled out, so that by one means or the other a very much better general standard than that prevailing is to be expected in the early future.

Free Electricity for Refrigerators

IN our leading columns a fortnight ago we referred to effective collaboration between manufacturers, supply authorities, and dealers in America in promoting the use of electric refrigerators. The combined interests are now advertising in the Press and circularising consumers that "free electricity to operate your refrigerator for more than three months" will be provided to the purchasers of specified makes within a limited time. The 100 kWh thus given away costs very little, but the price of electricity has a fascination for the consumer that is often quite out of proportion to its relative importance.

Electric Fans —Always

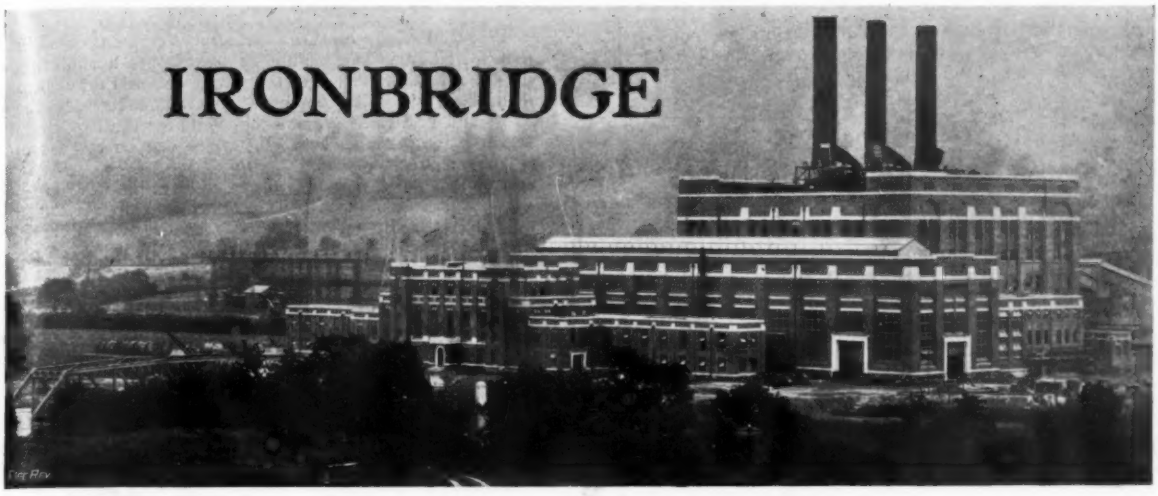
THE recent heat wave, no doubt, brought much discomfort to those whose pessimism regarding the British climate caused them to overlook the due provision of electric fans to keep the air moving. But is it realised, as it should be, that to keep the air moving is a matter of the first importance at all times, whether it be hot or cold? It has long been known—and investigations we carried out some years ago satisfied us as to the evidence on the point—that other conditions of the air, such as the slight increase in CO_2 caused by human exhalations, do not have the same influence on our comfort as air circulation. The skin plays a part that can hardly be over-estimated in respiration. Still air is the enemy, for in that we cannot breathe properly. The remedy is the use of the electric fan whenever the requisite stirring of the air is insufficient for healthy conditions. This applies equally in the winter, of course

Something for Nothing

THE idea that we can get something for nothing often lands us into needless expense. We came across a case in which the power requirements of a works were met by small steam engines dotted about all over the place. It was held that these engines cost nothing to run, as the steam came from waste heat evolved in steel making. Investigation showed that the waste heat was intermittent and that coal of varying amounts was used to maintain the steam pressure, requiring the whole-time services of a stoker. The steam main was run round the works and called for the attention of fitters every week-end to keep it tight. The steam hammers at the end of the pipe-line were often water hammers and needed a good deal of maintenance. These things, taken together, cost as much as the estimated cost of electricity, and the improvements expected were regarded as off-setting the capital expenditure. They did. In the upshot it was electricity that provided something for nothing.

"The Fire Was Caused By . . . ."

HAVE our recent strictures upon the Press for the way in which it glibly attributes mysterious fires to electrical causes been taken to heart? And is a new scapegoat to be employed in future? Press reports of a fire which occurred in a London suburb last week seem to indicate that such is the case, for in lieu of the too-familiar phrase the following words were used: "The fire was believed to have been caused by a burglar"! We can appreciate the forbearance of the sub-editor who refrained from adding "who was responsible for a short-circuit."



The West Midlands J.E.A.'s New Station

IRONBRIDGE Power Station, which is to be officially opened by the Minister of Transport on October 12th, is the first to be constructed by a Joint Electricity Authority. Its ultimate capacity will be 200,000 kW and the alternator of the initial 50,000-kW set is now being dried out. The remaining sets will be installed when required for grid operation.

The first thing notable about this station is its lovely natural surroundings in the Wrekin district. The West Midlands J.E.A. has shown appreciation of its responsibilities towards the public in the neat and well proportioned buildings, only the three 200-ft. steel chimneys, 9 ft. in diameter, proclaiming their purpose.

The next matter to force itself on the attention is the character of the site, which introduced special difficulties owing to the variation in the levels from 124 to 157 O.D. (at which the railway runs); the station itself is at 142 O.D., which is above any flood level that may be expected.

Considerable expense was saved in constructing the embankments for the railways and roads by a natural gift of material —a glacial deposit—which was cleared to provide room for the coal store. The Authority has constructed a light bridge across the Severn, but all goods exceeding 20 tons must be rail-borne. Coal trucks brought on to the reinforced concrete gantry can be emptied in five minutes, and an Avery weighing machine prints a ticket giving the net weight of the coal for each wagon. After a magnetic separator has removed tramp iron, the coal is conveyed by a 30-in. rubber-fabric belt to the tile-lined steel bunkers. The duty of this Mitchell conveyor, at 300 ft. per min., is 160 tons per hour, and all coaling can be done during an eight-hour shift; the lifting to the bunkers provides the steepest belt job we have seen. Alternatively, the coal may be taken to or from the store by another belt conveyor; the store (which will have an ultimate capacity of 70,000 tons) is spanned by a 230-ft. gantry with dredging buckets.

The Boiler House

An arresting feature of the boiler house is the apparent amount of space allowed for operation. We say "apparent" because we think much of the effect of airiness is due to the clean lay-out of the gear and to the maximum use of natural light (partly by arranging the boilers for each 100,000-kW boiler-house back to back). Space between the boilers is ample for comfortable ascent to any of the half-dozen tiers of galleries, and the useful lighting has been materially improved by galvanising the expanded-metal footways.

Each of the three Stirling boilers (one being spare) at present installed has a normal evaporative capacity of 225,000 lb. per hour (maximum 270,000 lb.), the largest yet constructed in Great Britain. They have heating surfaces of 21,600, 7,750, and 3,900 sq. ft., for the boiler, super-heater and water-walls, respectively. These three components transmit approximately 6,300, 7,200, and 22,000 B.th.u. per sq. ft. of heating surface. Steam conditions are 400 lb. per sq. in. and 800 deg. F. The drums are forged with riveted ends, and all tubes are expanded directly into drums and headers. Sixteen "Diamond" soot blowers have been supplied per boiler.

The temperatures of the gases at normal rating are 650 and 512 deg. F. at the inlet and outlet of the economiser, and 512 and 260 deg. F. at the inlet and outlet of the air heater. Bailey water-walls are used for the combustion chambers (ELEC. REV., January 1st, 1932, p. 13), the dimensions of which are 24 by 21 by 30 ft.

Six "Calumet" burners are provided per boiler with normal duties of 5,650 lb. per hour each. For starting up, a light grade of Diesel oil is supplied through auxiliary burners, so as to secure immediate ignition when the powdered fuel is turned on.

Coal Pulverising

The nine Fuller Lehigh ball pulverising mills, with an individual rating of seven tons per hour, are situated on the ground floor of the boiler house. Two of these will deal with the full load of each boiler. They are driven by 150-h.p., 730/490-r.p.m. Met.-Vick. motors. 50-h.p. 1,460-r.p.m. motors drive the exhauster fans, which draw an adjustable supply of hot air through the mills. Coal is fed from the bunkers via weighing machines and magnetic separators on the operating floor. D.c. ⅓ h.p. motors (the only d.c. machines in the station) are used to drive the mill feeders. No mill feeds coal into two adjacent burners.

Two Bowden-Ljungstrom air heater boilers reduce the temperature of the gases from 512 to 260 deg. F., and raise the temperature of 56,300 cb. ft. per min. of air (normal rating) from 60 to 415 deg. F. The Foster economisers have heating surfaces of 6,420 sq. ft. and normally raise the temperature of the water from 300 to 350 deg. F.

Varying the Fan Speeds

The Davidson forced-draught fans (two per boiler) are driven by 110-h.p. 970-r.p.m. Met.-Vick. squirrel-cage motors, speed variation being obtained by oil-couplings (Hydraulic Coupling & Engineering Co.) which obviate the necessity of damper control and permit the use of constant-speed a.c. motors. The oil

Pulverised fuel exhauster fans

supply is controlled from the boiler-house operating floor, 80 ft. below. The 220-h.p. induced-draught fans are coupled in a similar manner. Before the gases pass to the i.d. fans they are taken through cyclone arrestors (eight out of twelve per boiler in normal operation). The ashes are broken up by water jets installed under the boilers on the "Hydrojet" system, washed out of the hoppers, and forced into a tank. The mixture is pumped into a c.i. settling tank and the separated ash is loaded on to railway trucks.

There is a two-ton lift by J. & E. Hall, Ltd., in the boiler house, and various gauges and instruments by Industrial Combustion Engineers, Ltd., the Cambridge Instrument Co., Ltd. (who also supplied most of the instruments in the turbine house), and Geo. Kent, Ltd. An "Ingenia" remote level indicator by James Gordon & Co., Ltd., Hopkinson's boiler

mountings and valves, and Cope's regulators are employed. Steam is taken from each boiler by a 16 in. pipe to a forged steel receiver (24 ft. by 3 ft. 6 in. dia.) situated in the turbine room.

The Turbine Room

The rating of the B.T.-H. turbo-alternator is 50,000 kW m.c.r. and 40,000 kW e.r., but the steam consumption curve flattens out between the two points. The 1,500-r.p.m. turbine is of the two-cylinder double-flow type with impulse blading of stainless steel throughout. It has nineteen h.p. stages and eight double-flow l.p. stages. All control valves (the larger Blakeborough and the smaller Alley & McLellan) are of stainless steel. The 62,500-kVA alternator has an inherent reactance of 13 per cent. and, including the step-up transformer, 20 per cent, The stator is wound for 9,500 V with two separate parallel windings. The weight of the stator is 110 tons; it was too large for transport and was built up on site. The 350-V exciter is duplicated by a motor-driven dynamo.

The 9.5/33-kV 63,000-kVA transformer is connected direct to the alternator terminals. It comprises three single-phase, oil-immersed, self-cooled outdoor-type units. The windings are connected in delta-star. The lay-out of the large number of cables for the set (and indeed those throughout the station) make a very neat engineering job.

Condensing Plant

The twin-shell condenser is of the Hick-Breguet regenerator type with a cooling surface of 38,660 ft. A vacuum of 29.1 in. Hg. (bar. 30 in.) is guaranteed when dealing with 294,570 lb. of exhaust steam per hour and supplied with 36,000 g.p.m. of circulating water at 55 deg. F. with 10 per cent. of the tubes blanked off, the condensate temperature to be not less than 1 deg. F. above vacuum temperature. The two vertical spindle extractor pumps are driven by 55-b.h.p., 720-r.p.m. motors. The evaporators (15,000 lb. per hr.) are also of Hick, Hargreaves make. Four-stage feed heating is provided, and in addition there are drain and ejector coolers, to give a final feed temperature of 300 deg. F.

The three vertical-spindle Drysdale 36 in. c.w. pumps, each of 25,000 g.p.m. capacity, are driven by 300-h.p. 3-kV motors. They are housed in a building alongside the river and deliver water to the turbine room by two 8 by 8 ft. reinforced concrete ducts. Suction is *via* heavy bar screens in the river, Glenfeld and Kennedy penstocks and Brackett revolving screens. The efficiency of the siphon is about 80 per cent., and its effect will be to save about 4,000,000 kWh per annum when the station is completed. The four Weir boiler feed pumps are installed in the auxiliary bay of the turbine room, which also accommodates the switchgear for controlling the various pumps round the turbine.

A notable and, we believe, quite novel feature of this bay is that it is served by a 15-ton travelling crane. In the main bay is a 130-ton crane. Three of the pumps are driven by 310-b.h.p. 1,490-r.p.m. motors, and can deliver 340,000 lb. per hr. against a discharge pressure of 500 lb. per sq. in. The fourth pump (420,000 lb. per hr.) is steam driven and starts up automatically if the others should fail.

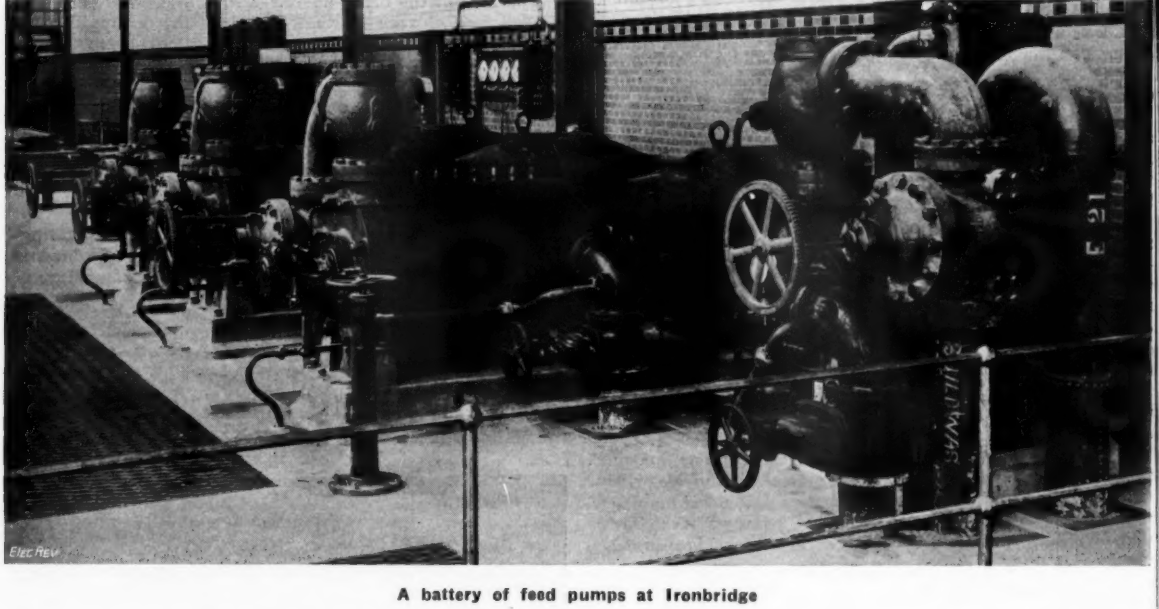
The B.T.-H. 33-kV metal-clad switchgear is accommodated i a separate building. The main gear, which has a rupturin capacity of 1,500,000 kVA, is of the totally enclosed drop-dow double-busbar type with duplicate circuit breakers for t generator and grid transformer equipment; for the two gro feeder equipments, single breakers (which can be coupled either busbar) are employed.

The auxiliary switchgear is of the same type, but the ruptu ing capacity is 500,000 kVA; it is connected to the main gea through B.T.-H. copper-in-concrete reactors, which in 3 phase connection have a capacity of 28,600 kVA with 5.25 pe cent. impedance. Oil-immersed selector switches connect th works power feeder to one bus-bar, and the Authority's h.v distribution system to the other.

The works supply is taken at 3,300 V for motors of 75 h.r and over, and at 400 V for the smaller machines; motors up 5 h.p. and the f.d. and i.d. fan motors are squirrel-ca machines, the others have wound rotors and Ellison starter Ellison switchgear controls duplicate Brush transformers 6,000 kVA in the first case and 1,200 kVA in the second. Thes are situated in the works power sub-station at the far end o the auxiliary bay in the turbine room.

The Control Room

On the top storey of the administrative block is the contro room. At the south side are panels for controlling the alter nators, grid transformers, and auxiliary supplies, and for pro viding direct indication between Ironbridge and the C.E.I control room in Birmingham. Opposite are the panels for th works power, the J.E.A. distribution system, and the link with Stourport generating station (from which the electricity re-



A battery of feed pumps at Ironbridge

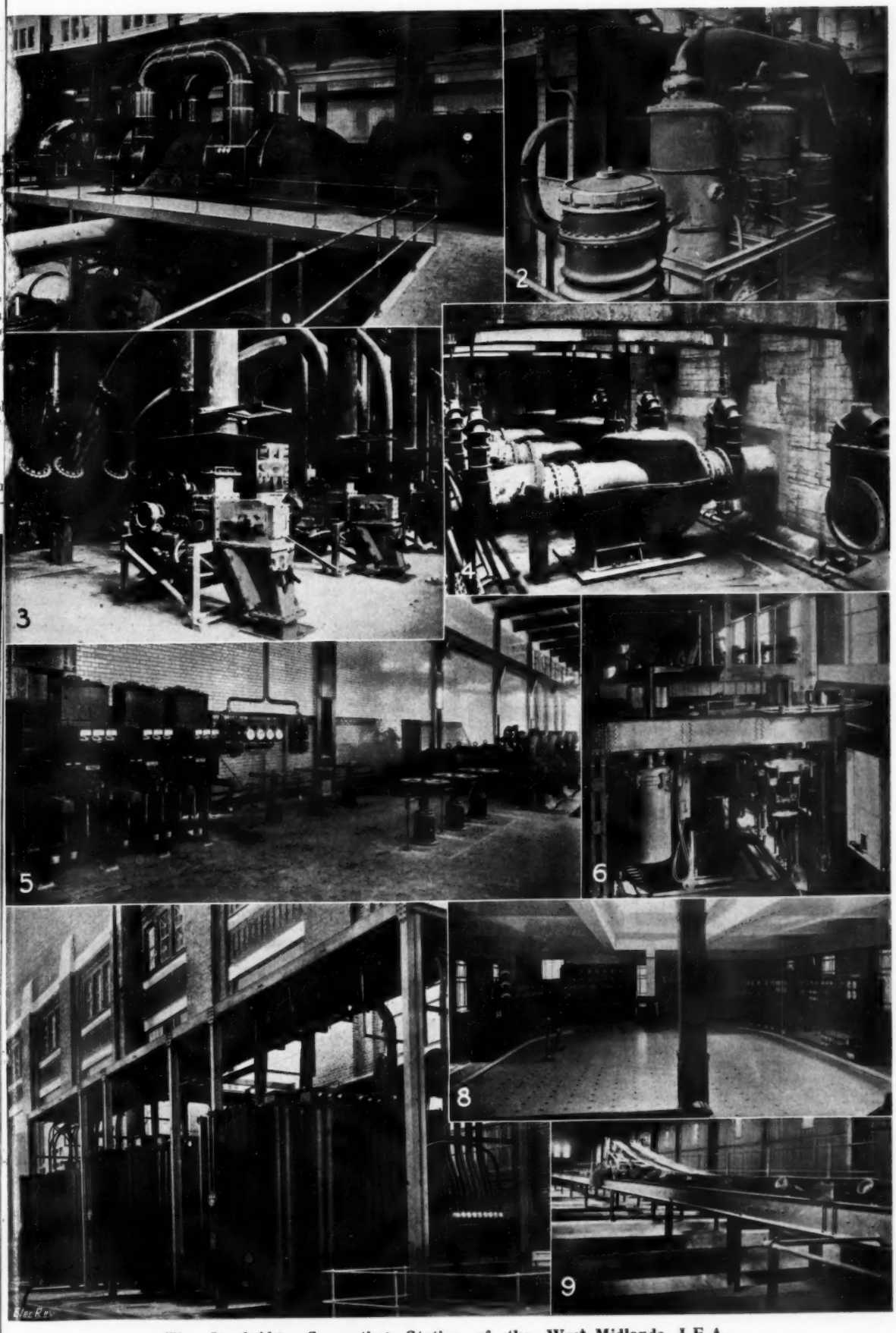
quired during the construction of Ironbridge has been obtained). The room also contains the G.E.C. control panels for the C.E.B. sub-station, the Landis and Gyr meter equip ment for the interconnection with the grid, and "Selsyn" telegraphs for the boiler house and turbine room.

On the mezzanine floor under the control room are the rheostats, cables, connections, and the 120-cell Chloride battery for providing a standby to the Met.-Vick. 15-kW motor generator for operating the protective gear and for giving emergency lighting. The battery is trickle charged by a West inghouse rectifier rated at 1.5 A, 300 V.

The Responsible Companies

The principal contractors were the Mitchell Conveyor and Transporter Co., Ltd., buildings and civil engineering, and coal-handling plant; Braithwaite & Co., Ltd., steel-work; Stirling Boiler Co., Ltd., boiler-house equipment; British Thomson-Houston Co., Ltd., turbine-room plant, C.W. pump-house equipment, and 33-kV switchgear; Sir Wm. Arrol & Co., Ltd., cranes; Geo. Ellison, Ltd., works power switchgear; Brush Electrical Engineering Co., Ltd., works power transformers, and Callender's Cable and Construction Co., Ltd., power cabling.

The station was designed by and constructed under the supervision of Mr. E. F. Hetherington, M.I.E.E., M.I.Mech.E., chief engineer and manager to the West Midlands Joint Electricity Authority.



The Ironbridge Generating Station of the West Midlands J.E.A.

1. The 50,000-kW turbo-alternator; 2. Duplicate evaporators; 3. Coal feeders and weighing machines; 4. Circulating water pumps; 5. Auxiliary bay in the turbine house; 6. 33-kV explosion-pot switchgear, 1,500,000-kVA rupturing capacity; 7. Step-up transformers, 9.5/33kV; 8. General view of the control room; 9. Belt conveyor for coal handling.

Waste Insulating Materials. By A. A. C. Dickson

Suggestions for their reclamation and use

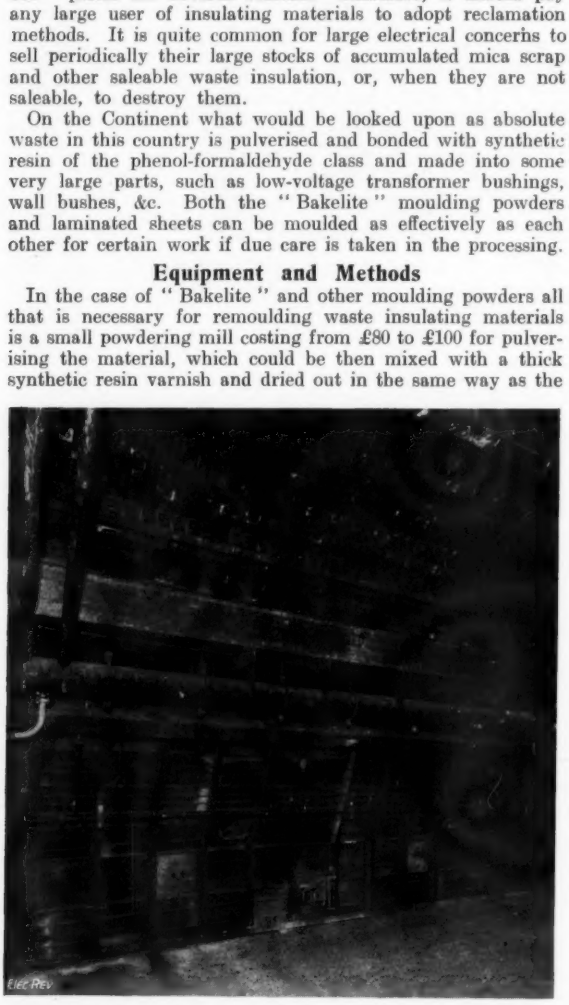
THE utilisation of waste insulating materials, including mica, is worthy of attention and very careful consideration by all large users for the reason that this so-called waste is being converted on the Continent into valuable insulating materials at very much lower figures than they would cost if made from fresh raw materials and are being sold extensively here, invariably at lower prices than goods made in this country.

What is done to advantage on the Continent can be done to advantage at home. Such remoulded insulation is generally as good as that made from fresh raw materials, and almost as good as the best made, and yet it can be sold at "knock-out" prices for obvious reasons. Therefore, it should pay any large user of insulating materials to adopt reclamation methods. It is quite common for large electrical concerns to sell periodically their large stocks of accumulated mica scrap and other saleable waste insulation, or, when they are not saleable, to destroy them.

On the Continent what would be looked upon as absolute waste in this country is pulverised and bonded with synthetic resin of the phenol-formaldehyde class and made into some very large parts, such as low-voltage transformer bushings, wall bushes, &c. Both the "Bakelite" moulding powders and laminated sheets can be moulded as effectively as each other for certain work if due care is taken in the processing.

Equipment and Methods

In the case of "Bakelite" and other moulding powders all that is necessary for remoulding waste insulating materials is a small powdering mill costing from £80 to £100 for pulverising the material, which could be then mixed with a thick synthetic resin varnish and dried out in the same way as the



Ironbridge Power Station: Ash hopper and extension of the Bailey wall. **(See pages 311-2.)**

varnished papers (used for board building and tube and cylinder rolling) are dried out, just heating the mixture sufficiently to drive off all, or nearly all, the volatile matter without affecting the resin itself, so that it may be capable of being moulded again in powder form.

Then this mass of dried and thoroughly mixed powdered waste insulating material and varnish is broken up and finely powdered again to get a more or less perfectly uniform mixture or alloy of the waste filler and resin. This homogeneous mixture, which is as good as most of the material on the market to-day, is then filled into standard moulds and treated in the usual way. Mixtures made from waste materials do not need any more holding space (in the moulds) for the loose mixture than the space that is generally occupied by the mixtures made from fresh raw materials, and they are treated in the same way as the latter.

With the exception of the construction of the moulds and filling them, practically everything can be done automatically by any good modern hydraulic moulding press, which is usually built to give the right pressure and timing, and allows for the proper heating and cooling arrangements and the discharging of the moulds. Some of the presses used in this country are most wasteful in operation. The advantages to be gained from the use of a universal automatic hydraulic moulding press specially developed for moulders of these products to reduce the cost of producing duplicate parts where handled in considerable quantities are:—(i) very material reduction of attention required on the part of the operator; (ii) reduction of the idle time between moulding operations; (iii) elimination of defective moulded parts; (iv) simplified press equipment at reasonable price; and (v) rigid press construction at reasonable price.

Fully Automatic Control

Every part of the operating cycle from the beginning to end is completely controlled by a multiple unit motor-driven valve. This is built as a separate unit and is situated to the right of the press. Each of the seven valve stems is actuated in proper sequence by a suitable cam. The camshaft is driven through an adjustable speed-change mechanism by a small electric motor. This automatic valve can be adapted to almost any moulding cycle, both as to duration of each part of the operation and sequence of operation.

In the usual "Bakelite" moulding cycle the operations automatically controlled are as follows:—Steam is applied to the chambers of both upper and lower dies; the dies are moved to the pressing position; low hydraulic pressure is applied to the main press cylinder for closing the dies; high hydraulic pressure is applied to the main press cylinder after the "Bakelite" has become plastic and has had an opportunity to flow into every cavity of the dies; the steam supply to the die chambers is cut off; cold water is circulated through the die chambers for chilling and setting the cooled pieces; the high pressure is cut off from the main cylinder, which is then connected with the return line; the main ram is withdrawn through the action of the auxiliary rams, thus separating the two halves of the die.

The ejecting mechanism is automatically operated at the same time in the lower mould; an ejecting device is also sometimes arranged on the revolving head; hence ejecting pins can be used in both halves of the die, or either one, as may be desired. The head carrying the upper part of the die is revolved through an angle of about 120 deg., and the table carrying the lower half of the die is moved to the forward end of the table supports, both of these movements taking place simultaneously. At this point the camshaft on the automatic valve reaches the end of its revolution. Here a simple and positive electric cut-out mechanism is actuated by a cam, thus stopping the motor.

The operator can now remove the finished piece, clean the dies, place new inserts, and reload with raw compound or mixture. He then starts the motor and a new revolution of the valve camshaft begins. Now the motions of the head and table are reversed, so that they return to the pressing position. However, the ejecting mechanism does not function during this return movement. Both the head and table take a positive position in which they are rigidly held during the entire pressing operation, so that alignment of both halves of the die is assured.

The Advantages Secured

First and foremost, waste material of practically little or no value is used as the filler. By making one's own moulding mixture one knows what it contains, and it costs very much less than it would if bought outside. The processes of making the mixture and handling the press are so simple that, once shown, no further training is necessary to make both mixture and mouldings. Then there are the advantages of an economical automatic hydraulic moulding press in which the labour costs are reduced because of complete automatic control. No attention by an operator is required during the actual moulding cycle, and younger and less experienced operators can be employed. The operator can carry out other duties near the press during the moulding operation, or one operator can attend to several presses.

The idle time between operations is reduced to the very minimum, due to the movement of the two halves of the die out of pressing position to one of maximum convenience and safety. This is an especially vital feature when complicated dies are used and inserts must be put in place by hand. The safety and comfort of the operator in working on the dies in this position are other features of great importance.

The production of improperly moulded parts, which will not pass inspection, is impossible, due to the fact that the entire moulding cycle is timed perfectly by automatic control, with the human element entirely eliminated. Consequently, once the press is set and properly timed by the foreman for the particular piece of moulding to be produced, the operator merely serves the press and does not control it.

The British Association

Proceedings at the York meeting

YORK was the birthplace of the British Association for the Advancement of Science, for it was in the premises of the Yorkshire Philosophical Society, on the suggestion of David Brewster, that the decision to form the Association was taken—on September 26th, 1831.

Since that date the Association has met three times in the city—in 1844, 1881 and 1906—and it is very appropriate that it should commence its second century there.

Although times are hard with scientists as well as with people in other walks of life, a goodly assembly listened to Sir Alfred Ewing's presidential address in the Exhibition Hall on Wednesday evening. An outline of the address appears on this page.

The proceedings commenced early on Thursday morning. In Section G—Engineering—three papers were read, all of an electrical character, as will be seen from the accounts of them which we print on the next page. There were also some papers bearing on the electrical subjects in Section A—Mathematical and Physical Sciences; a paper on "Material Standards of Resistance: The B.A. Coils, 1881-1932," was presented by Sir Richard Glazebrook and Dr. L. Hartshorn. In the afternoon members of Section G visited the Blackburn Aeroplane and Motor Co., Ltd.

This morning (Friday) the proceedings of the Engineering Section were to open with Professor Miles Walker's presidential address and following this papers were to be read by Mr. A. P. M. Fleming on "An Engineer's Review of Soviet Enterprise," and by Dr. F. W. Carter on "Magnetic Noise in Dynamo-Electric Machines." The business of Section A was to include a discussion on "Supra-Conductivity" opened by Prof. J. C. McLennan, who has recently conducted some remarkable experiments in this direction. Sir Richard Glazebrook and Dr. Ezer Griffiths were to present a report on "Electric and Magnetic Units: The Paris Conference of July, 1932."

The visits arranged for Section G to-morrow (Saturday) include one to the Kirkstall station of the Yorkshire Electric Power Co.

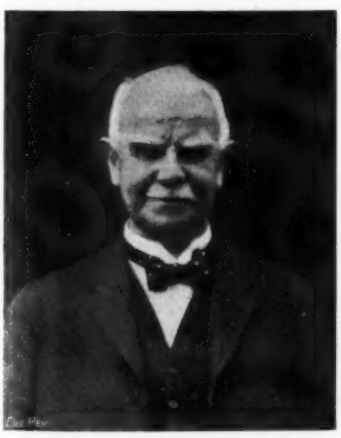
Among the matters which are to come before Section G during the last three days of the meeting (September 5th to 7th) are the following: A discussion on "Railway Traction"; "Steam Power," by Sir Seymour B. Tritton; "Oil Engine Power" by Sir Henry Fowler; and "Electric Power" by Mr. F. Lydall; "A New System of Lighting at the Coal Face" by Professor W. Cramp; "The Pulling into Step of a Synchronous Induction Motor" by Dr. H. Cotton and Mr. F. A. Hough; "The Economical Control of the Speed and Power Factor of Three-phase Induction Motors" by Dr. T. F. Wall; and a report on electrical terms and definitions.

The proceedings in Section A will also include one or two papers of an electrical character. The papers and discussions in Section F—Economic Science and Statistics—embrace several of interest to electrical manufacturers, and the same may be said of Section J—Psychology—which is dealing with a number of industrial questions.

An Engineer's Outlook

THE inaugural address of the president, Sir Alfred Ewing, which was delivered on Wednesday evening, dealt at some length with the construction and development in the theory of the atom up to the recent discovery by Dr. Chadwick of the "neutron," in which an electron and a proton are very closely associated; its extreme smallness and density, together with an absence of magnetic field, give it a unique power of penetrating matter. It provides a powerful tool for further research.

Dr. Cockcroft and Dr. Walton have continued the work of Lord Rutherford in the bombardment of the atom. They have quite recently been able to project single protons into the nucleus of lithium. This is the first artificial splitting of the atom by a laboratory process without recourse to the violent projectiles which radioactive substances provide. The method has also been successfully applied to the breaking up of the atoms of other elements.



Sir Alfred Ewing, K.C.B., F.R.S., this year's President of the British Association

It is believed that the accepted principles of conservation in respect of momentum, energy and mass have held, though matter is liable to transformation into energy, and *vice versa*. It must be remembered that any attempt to portray the structure of the atom in the language of ordinary experience is to give undue significance to symbols and analogies that are more or less invalid.

These developments are in direct sequence to the renaissance of physical science that took place in the middle 'nineties. In quick succession came the discovery of X-rays by Röntgen in 1895, of radio-activity by Becquerel in 1896, and of the electron by J. J. Thomson in 1897. Thanks mainly to Thomson, Rutherford, and Bohr we now recognise the atom of any substance to be built up of electrons (negative electricity) and protons (positive electricity) both indivisible and indestructible.

The Association's Achievements

Between discovery and invention there is always, in effect, a close partnership, and from the first the Association took cognisance of engineering as one of the subjects it was created to advance. Among its achievements in the electrical sphere was the setting up of a committee in the middle of the last century (at the instigation of Lord Kelvin) to settle international electrical standards, which were urgently required for telegraphy, and in the 'eighties for the transmission of power. In the 'nineties, the Association moved the Government to establish the National Physical Laboratory.

It was at the Oxford meeting of 1894 that Sir Oliver Lodge demonstrated a form of wireless telegraph, which was later brought into use through the practical skill of Marconi. The whole art of electrical communication may be regarded as an unqualified blessing, but some other inventions have given rise to perplexity and alarm. The engineer's gifts to the world have been and may be abused; in some there is potential tragedy as well as present burden. Man was ethically unprepared for so great a bounty, and is still unfit for the responsibility it entails; the command of Nature has been put into his hand before he knows how to command himself. In the affairs of nations, as of individuals, there must be some sacrifice of accepted predilections as to national sovereignty if civilisation is to survive.

What of the Future?

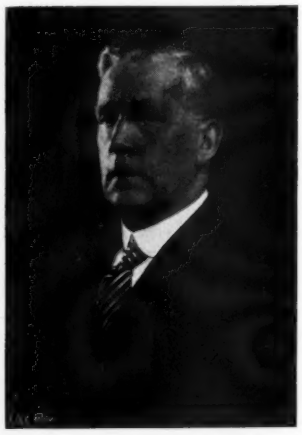
Another aspect of the mechanisation of life is the loss of joy of craftsmanship, due to the mass-production of articles. The world is glutted with competitive commodities, too numerous to be absorbed, leading to unemployment, which is worse than drudgery. Even if we envisage a distant Utopia in which there will be a perfect adjustment between labour and its fruits, the question remains of how a man is to spend the leisure that he has won by handing over nearly all his burden to a mechanical slave. Dare he hope for such spiritual betterment as will enable him to use it well?

It is surely unthinkable that man is destined to atrophy and cease through cultivating one of his most god-like faculties--the creative ingenuity of the engineer.

The Call to the Engineer

IN his presidential address to Section G—Engineering—Professor Miles Walker refers to some of the more notable of recent electrical developments. The mercury-vapour arc with a positively charged grid acts as an ordinary valve, and, by connecting two grids to an alternating voltage, a pair of valves will deliver a.c. from a d.c. source, making a.c. transmission at 180 kV easier than the a.c. at 130 kV. The device can also be used to change frequencies and to convert from single to three phase, improving the prospects of three-phase traction.

The Drumm battery has revived the hope of using an electric locomotive without a trolley connection. The nation might well carry out researches on batteries possessing the required characteristics. Waste of coal and air pollution should be corrected by low-temperature carbonisation, and the burning of soft coal should be prohibited as in Paris.



[*Lafayette*

Prof. Miles Walker, M.A., D.Sc., the President of Section G

Prof. Walker asks (1) What is wrong with the world? (2) Why are the proposed solutions inadequate? (3) How could engineers make things better? The three main defects are the poverty in material possessions, poverty in outlook, and incompetence of our rulers. The real reasons for high prices in a civilised country is that only about fifteen per cent. of the inhabitants make a real contribution to wealth; there are too many traders and too few real workers.

To enable all men to be as wealthy as possible things that contribute to well-being must be made at the highest speed with the best appliances, and the method of distribution should be so efficient that the people who make the things are able to buy them.

In politics, the kind of mental training required to solve an economic problem is the same as that required to tackle engineering problems. Prof. Walker suggests that the Government should found an experimental colony under the auspices of engineers, scientists, and economists, with the object of ascertaining how far it is possible under optimum existing conditions for a group of 100,000 persons to maintain themselves and continually to increase their wealth when freed from the restraints and social errors of modern civilisation.

Some of the Papers

THE papers presented to the Engineering Section (G) yesterday, included one by Dr. G. W. C. Kaye on "The Suppression of Noise," in which it is pointed out that noise suppression depends upon noise measurement, which has been greatly facilitated in recent years by the development of electrical methods. Noises can be analysed into spectra, and measured by the microphone, or they can be matched aurally against a calibrated standard of loudness.

The unit of intensity is the decibel, and the auditory range of loudness embraces about 120 decibels. Noise should be silenced at its source, failing which isolation is better than absorption; all three have been effectively used to minimise noise in aeroplane liners. New acoustic laboratories are being erected at the National Physical Laboratory.

Rural Electrification

Mr. R. Borlase Matthews, in a paper on "Rural Electrification and the Grid," expressed the view that the greatest field for the use of electric power from the grid was in rural areas (in which 320 authorised undertakers supplied electricity), but that the farm load had been comparatively neglected. A grid supply would ensure a low price for electricity at the smaller centres, which should facilitate rural development. The general principles associated with rural supply were stated with particular reference to the Mid-Lincolnshire rural electrification scheme, which covered an area of over 1,630 sq. miles.

The possibilities of reducing the cost of rural distribution lines and the potentialities of the farm load were briefly discussed. The future development of British farming would take the form of intensive cultivation rather than the adoption of prairie methods. To-day farming was carried on with antiquated methods and machinery, yet farmers in the aggregate used more power than all other industries put together.

There were three hundred ordinary uses of electricity on farms apart from larger farm current-consuming apparatus, such as the 30-h.p. rain cannon, 150-h.p. hay drying and disintegrating plants, 250-h.p. electric ploughs, and 80-h.p. combined harvester threshers, electric soil heating, moving platforms for the continuous milking of cows, and auxiliary industries (*e.g.*, alcohol, beer, canning, flour, starch, and sugar manufacture).

The paper concluded with recommendations regarding propaganda activities and tariffs.

The Electric Propulsion of Ships

In a paper on this subject Dr. C. C. Garrard stated that, excluding war vessels, the shaft horse-power of electrically propelled vessels amounted to over one million with turbines, and over 100,000 with oil engines. Of these 90 per cent. had been built in the United States, largely due to the stimulus afforded by adoption of electric propulsion for the capital ships in its Navy.

The naval architect had to take into account the whole of the ship as a means of transporting passengers and merchandise. The effect upon revenue-earning capacity was much more important than a reduction in fuel cost; for liners electric propulsion improved efficiency, while for vessels of the self-unloading type, requiring large amounts of power in dock, it was a necessity. In other cases ease of control and manœuvre was a determining factor.

D.c. motors are suitable for propulsion when the s.h.p. does not exceed 3,000. As turbines for such small powers would not be considered, the comparison is between the oil-electric and the motor ship. Two screws would be required in the latter case, as against one in the former, in which two motors would be mounted on one shaft.

With the electric system the speed of the propeller can be low and efficient. These considerations more than compensate for the electrical losses. Easier starting and elimination of engine reversals are incidental advantages of electric propulsion.

With electric propulsion bridge control was possible. Dr. Garrard advocated the greatest possible use of automatic control, which had proved entirely reliable on land. The paper concluded with a consideration of the propulsion equipments of the *Viceroy of India*, the *Monarch of Bermuda*, and e.m.v. *Cement Karrier*, with a discussion of the various systems and the conditions that determined the choice between them.

Industrial Co-operation

Mr. A. G. H. Dent opened a discussion yesterday before Section F (Economics) on the preparation and uses of statistics for the business executive. He divided essential statistics into those internal to the company, dealing with operating results, and those external to the company, relating to markets, competition, the industry itself, and the general economic position.

A statistical report should consist of concise statements backed by figures and charts. The graphic system had the advantage of enabling an executive to grasp rapidly uncoordinated figures. The most important field for statistical work was the company budget, in which demand, orders received, sales invoiced, net profits, &c., were estimated ahead.

The "higher control" method related company figures and gave the managing director a complete picture of operations and their results, the data being worked through from orders to the final net profit.

The "Clarnico" stand at the Confectionery Exhibition **(see page 338)**

Some Driving Forces in the Industry

An old-established lighting fittings company

DURING the present year the combined firms of Osler & Faraday are celebrating the 125th anniversary of their foundation. Before their amalgamation in 1919 as Osler & Faraday, Ltd., both these firms had been engaged in the lighting trade for over a hundred years. With histories extending back into Georgian days it almost necessarily follows that an examination of the records of both firms would afford numerous interesting glimpses into the past.

Messrs F. & C. Osler had made a name for their glasswork even before they constructed the great glass fountain for the Crystal Palace Exhibition in 1851. Besides the making of crystal chandeliers and glassware of all kinds for the home market, they had a large connection abroad and especially in India, where they were commissioned to make glass thrones, tables, chairs, chandeliers and sceptres for many Indian potentates. They were wonderful pieces of work, for the splendour of the East inspired their design and the chandeliers sometimes held hundreds of wax-candles for the dazzlement of the courtiers of those wealthy princes.

A reference to wax-candles recalls the fact that it is only during the last fifty years that electric lighting has occupied the attention of the firm. In the first seventy-five years of its existence candles, oil-lamps and gas were the only means of illumination.

Founded by Michael Faraday's Brother

Electrically the history of the firm of Faraday & Son is still more interesting because it was founded by Robert Faraday, the elder brother of Michael Faraday, the centenary of whose discovery of electro-magnetic induction was celebrated in London a year ago this month. Robert was the brother who provided the means to enable Michael to attend his earliest lectures in a dark court off Fleet Street. And later Michael was able to help the venture of his brother in many ways. It is not generally known that he put his savings into the little business until they reached the sum of £800. Nor was it realised until recently that inventions which were attributed to Robert Faraday were really the work of his more famous brother Michael.

It will interest many of our readers to learn that in the archives of the firm there are many instances of this connection between the two brothers, some of which were made public for the first time during last year's celebrations.

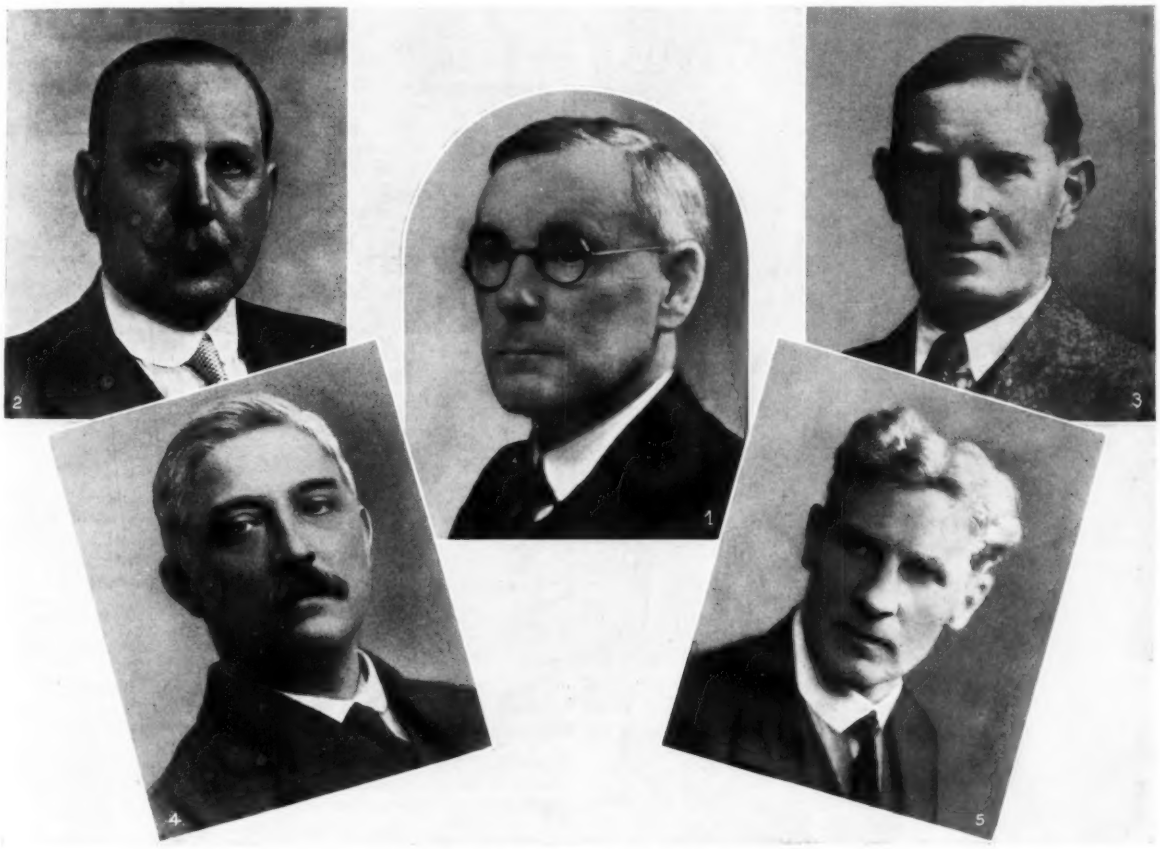
Throughout the history of both branches of the firm there has always been a direct descendant of the founder connected with it, and at the present day three great-grandsons of the respective founders are acting as co-directors of the combined business.

The Company's Showrooms

A visit to Lanthorne House, Newman Street, W.1, the showrooms of the company, is well worth while. The collection to be seen there illustrates in a remarkable way the development of the art of illumination. In one of the apartments the visitor is shown a series of lamps dating from primitive times and including many notable examples of classical design and craftsmanship.

The showrooms are, broadly, planned according to a "period" method, rooms being set apart for the display of designs from the principal English epochs, while the development of French art during the past three centuries is also well represented. But apart from this one can generally see designs prepared and produced by the company for Eastern clients—work for which Osler & Faraday have gained a considerable reputation.

Modern styles are not neglected and the showrooms contain comprehensive ranges of the most up-to-date products in glass and metal. Metal craftsmanship has been the company's *forte* for a century or more but in these days glass is predominant. All the same the company demonstrates how graceful metalwork can be combined with modern glassware to form tasteful fittings for any situation and thus helps to keep going an industry which has been rather badly hit by the demand for fittings in which practically nothing but glass is used.



The Directors of Osler & Faraday, Ltd.

1. Mr. J. A. Osler (*Whitlock & Sons*), chairman. 2. Mr. J. Priest, M.B.E. (*Lafayette*), director and sales manager. 3. Mr. A. O. Dowson (*Percy Wynne*), works director. 4. Mr. F. J. Robins, M.I.E.E., director and engineer (India). 5. Mr. Paul Faraday (*Mindel*), director and art adviser. Messrs. Osler, Faraday and Dowson are great-grandsons of the founders of the original firms.

Electricity in a Cocoa Factory

THE link between the electric drive and absolute cleanliness is very apparent at the Bournville works of Cadbury Bros., Ltd. Foodstuffs are untouched by hand throughout the whole of the processes, and the following notes and illustrations show how much the simplicity and easy housing of the electric motor, and its particular adaptability and ease of control contribute to the achievement of this desirable feature.

Not a single non-electric drive can be seen in the whole of the factory, and the significance of this fact will be appreciated from the following figures. There are 38¼ acres of factory floor space, and well over 7,000 hands employed. Something like 1,700 motors are in use, varying in size from ¼ to 300 h.p. There are 9,000 lighting points, generally with "Benjamin" and "Mazdalux" industrial reflector fittings, representing about a million c.p., 50 electric lifts, and 240 electric clocks. The annual consumption is 13 million kWh.

The Factory Power Station

Because of the large demand for process heat a considerable portion of the electrical energy used is generated on site, the amount being governed by the heat requirement, and the balance is attained by the use of the whole of the exhaust. There are three 625-kVA, 440-V, Belliss-Metropolitan-Vickers engine-alternator sets, which are served by Babcock & Wilcox land-type 20,000-lb. w.t. boilers.

The a.c. plant runs in parallel with a supply from the Birmingham Corporation undertaking, which is received at 11,000 V and stepped down on site to 440 V. The majority of the motors in the works operate at 440 V, a.c., but a fair number of d.c., 230-V, variable-speed motors were seen. For supplying these motors, the lighting, magnetic separators, &c., there are three rotary convertors—one 400 kW and two 300 kW. Mr. E. R. Phillips, the chief electrical engineer, waxed enthusiastic over the a.c. drive. He had found the a.c. maintenance to be about one-sixth of that of d.c., and had in most cases experienced great advantages from individual drives.

Grinding and mixing operations are responsible for the bulk of the load, and in these connections advantage is taken of the opportunity to secure high load and power factors, rebates for each of which are obtained from the supply undertaking. Large-scale mixing is a 24-hour process, and two 300-h.p. synchronous induction motors used for chocolate mixing are designed for a leading p.f. of 0.9

How Cocoa is Prepared

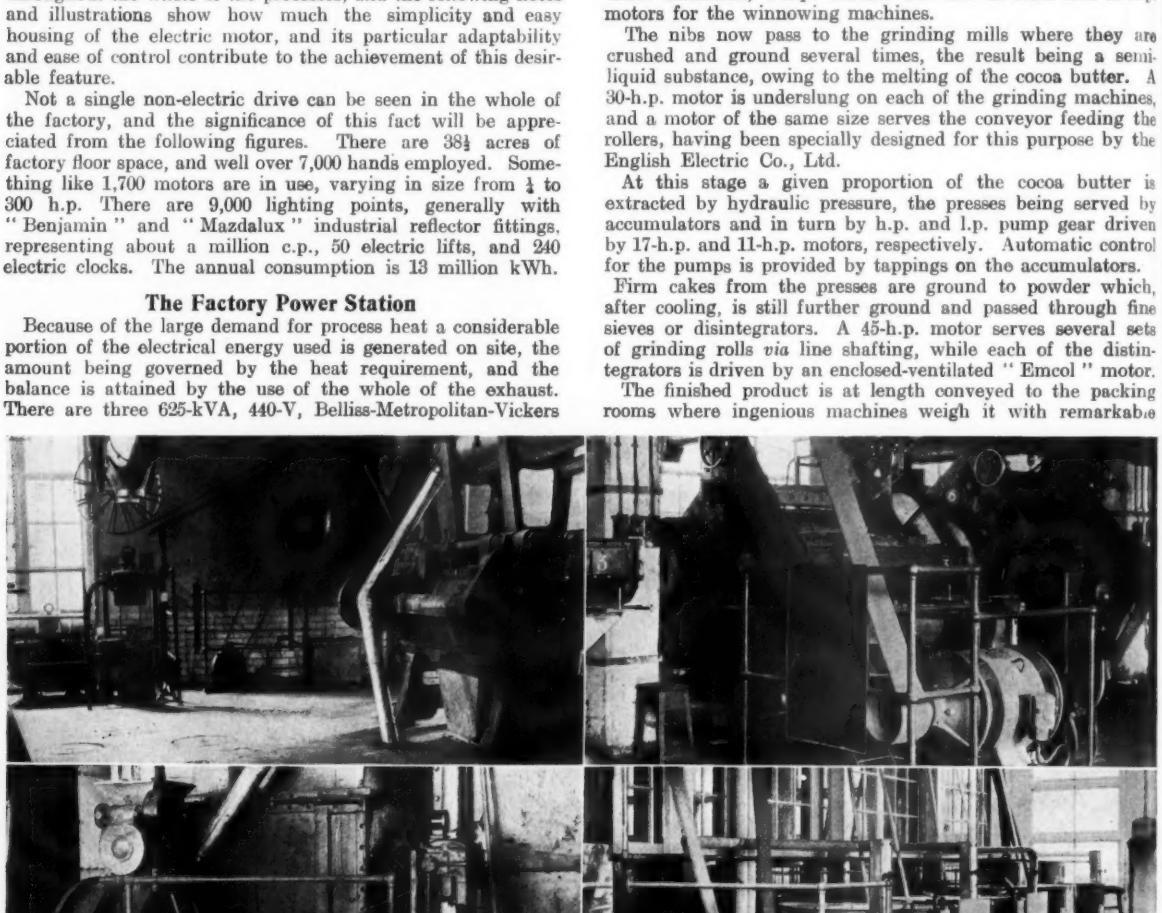
Cocoa is made from the cocoa bean, the seed of the cocoa tree cultivated in the tropics. From the bonded stores the beans are conveyed by elevators to revolving cylindrical ovens, the temperature of which is controlled by electrical thermostats. Twelve roasters were seen driven by a 15-h.p. motor *via* line shafting. Roasting facilitates the next process, kibbling, which not only liberates the beans from the husks, but breaks up the bean into "cocoa nibs." The shell is removed by winnowing machines. Individual drives are employed for these machines, 3-h.p. motors for the kibblers and 11-h.p. motors for the winnowing machines.

The nibs now pass to the grinding mills where they are crushed and ground several times, the result being a semi-liquid substance, owing to the melting of the cocoa butter. A 30-h.p. motor is underslung on each of the grinding machines, and a motor of the same size serves the conveyor feeding the rollers, having been specially designed for this purpose by the English Electric Co., Ltd.

At this stage a given proportion of the cocoa butter is extracted by hydraulic pressure, the presses being served by accumulators and in turn by h.p. and l.p. pump gear driven by 17-h.p. and 11-h.p. motors, respectively. Automatic control for the pumps is provided by tappings on the accumulators.

Firm cakes from the presses are ground to powder which, after cooling, is still further ground and passed through fine sieves or disintegrators. A 45-h.p. motor serves several sets of grinding rolls *via* line shafting, while each of the disintegrators is driven by an enclosed-ventilated "Emcol" motor.

The finished product is at length conveyed to the packing rooms where ingenious machines weigh it with remarkable speed and accuracy, depositing the required quantities in paper bags which are inserted into tins. The electrical weighing machines are driven from shafting served by a 25-h.p. motor.



Top left: Extrusion presses for extracting cocoa butter—75 h.p. motor. Top right: Cocoa-grinding machines. Bottom left: Disintegrator fitted with an "Emcol" motor. Bottom right: A bank of chocolate mixers.

Examples of drives at Cadbury's works

Making the Tins

Tin-box making is an important part of the factory processes, and in most cases the machines are equipped with variable-speed motors for individual driving—5 h.p. for body forming and 3 h.p. for bottoming. Lidding machines have ¼-h.p. individual drives, and a special beading machine for the top edges of the tin boxes, affording protection to the fingers, is driven by a 3-h.p. motor. Labelling machines are fitted with electrically heated shellac pots.

The closely allied industry, chocolate making, involves a multitude of processes, because of the enormous range of delicacies available. Chocolate proper is produced by long-period grinding and mixing along somewhat similar lines to the cocoa-making operations, and the resulting paste is used in various forms for moulding and covering purposes. The outstanding chocolate drives are the two 300-h.p. synchronous induction motors already mentioned.

Many of the larger motors were supplied by the Crypto Co., including one of the synchronous equipments, served by a Brookhirst starter, while the other similar motor and its control gear were supplied by the English Electric Co., Ltd. The Crompton Parkinson nameplate was seen on a good number of the smaller motors. Generally the starters were supplied by the Electro-Mechanical Brake Co., Ltd., Brookhirst Switchgear, Ltd., and George Ellison, Ltd.

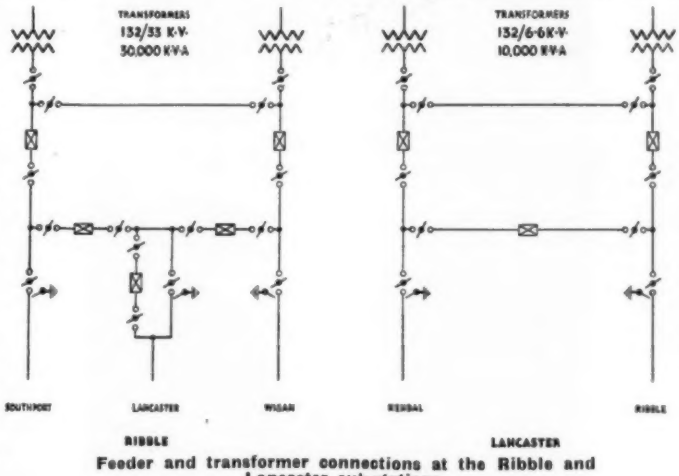
The North-West Grid

The 132,000-V switchgear on the western ring

ON the western ring of the north-west section of the national grid there are eleven 132-kV switching stations situated at Carlisle, Kendal, Lancaster, Ribble, Wigan, Southport, St. Helens, Clarence Dock (Liverpool), Percival Lane (Runcorn), Warrington, and Crewe. Messrs. Ferguson, Pailin, Ltd., are the contracting engineers for the entire 132,000-V switchgear at these stations, and those at Ribble and Lancaster were the first to be put into commission.

The Ribble installation is a five-switch station so arranged that it may be extended to a low double busbar type at a later date. It controls two 132/33-kV, 30,000-kVA transformers and three 132-kV feeders, the connections being as indicated in the schematic diagrams. Lancaster is a three-switch station, controlling two feeders and two transformers. It is possible to isolate any circuit breaker without interrupting the supply to any of the lines or transformers. The circuit breaker may thus be cleaned in perfect safety.

The feeder protection is of the impedance type and is arranged to trip all the circuit breakers controlling a particular feeder; that is, in the case of the Southport line at Ribble, it trips a breaker on the transformer circuit as well as the section breaker. Protection of the transformers is restricted earth leakage, which consists of three current transformers in the main connections connected in parallel with a current transformer in the section switch. It also covers the by-pass connections constituting combined busbar and transformer protective gear. The occurrence of a fault on either side of the transformer causes tripping on the high- and low-voltage sides.



Feeder and transformer connections at the Ribble and Lancaster sub-stations

Synchronising is provided by means of two potential transformers connected to the lower-voltage side of the power transformers, which are suitably compensated to adjust for magnetising current and the losses in the power transformer. To obtain synchronising facilities on the third feeder to Lancaster at Ribble, a 132-kV tapped bushing, connected to appropriate tuning equipment, and a potential transformer are employed.

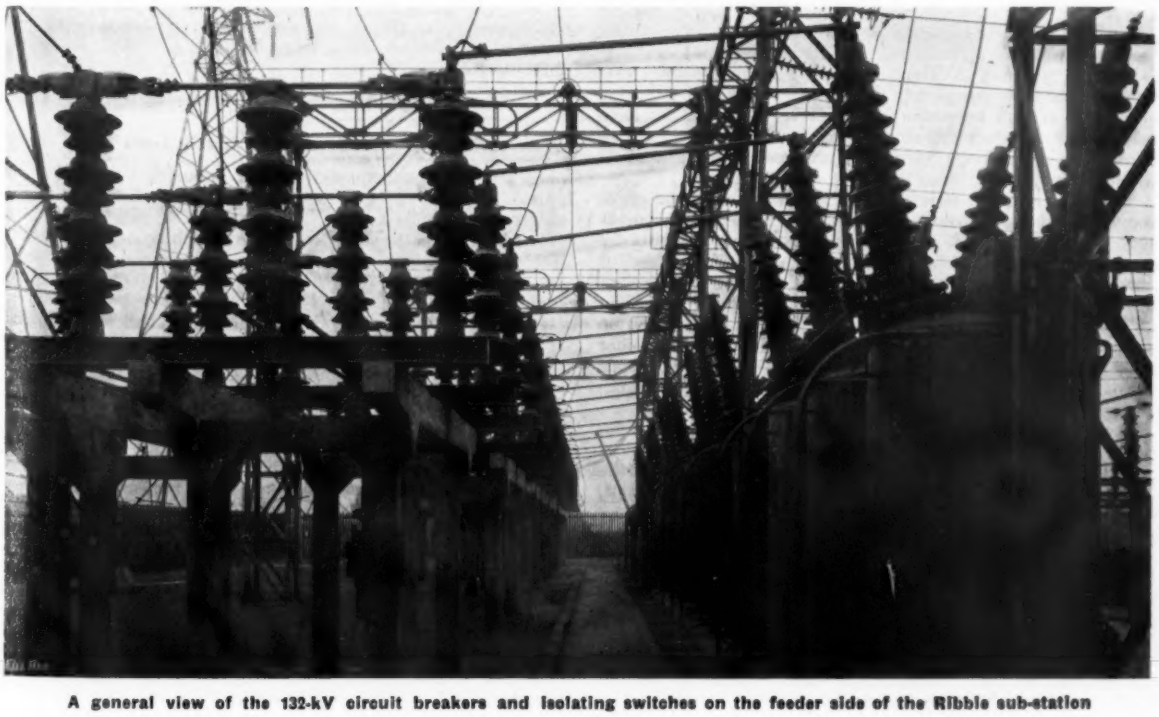
At Ribble the oil circuit breakers are situated at the side of the station where the feeder connections are brought in from the 160-ft. high tower which terminates the lines from Wigan and Southport. The tank and top plate of each single-pole breaker form a one-piece welded rolled-steel unit. The top plate is domed to provide an expansion chamber above the oil for gases. A pebble-filled venting chamber separates oil and vapour, the oil returning to the tank and the vapour being permitted to escape into the atmosphere. Access to the interior of the breaker is made by means of a man-hole in the top dome. The tank sides extend down beyond the dished bottom to form a rigid base. Oil filling, draining, and sampling facilities are incorporated in each tank.

Breaker contacts are robustly constructed to meet the conditions imposed during short circuit. Arc control devices are incorporated which effect a reduction in arcing time, and hence a reduction to a minimum of the energy liberated in the oil circuit breaker tank.

The individual breaker mechanisms of the three-phases are coupled together, the coupling rods being enclosed by removable weatherproof covers. The operating mechanisms are of the "S.C." solenoid design, incorporating the chain-in compression feature. Solenoid mechanisms are mounted in separate weatherproof kiosks fitted with lift-off access doors. The oil switch bushings are of the condenser type, the current transformers being arranged with the earth band between the bushing and secondary, inside the tank. The design is such that, in the rare case of fracture of a bushing, it can be withdrawn for replacement by a spare without removing either the current transformer or the arc shield.

The oil purification scheme consists of a centrifugal separator and blotter press. Two main oil bus pipes are provided, one of copper for the ingoing clean oil and the other of steel for the outgoing dirty oil. Both main bus pipes are connected by separate dual piping to the oil tank of each individual phase. A by-pass pipe connects the two pipes of each circuit breaker.

The oil circuit breakers are all solenoid electrically operated from the control board. Solenoid kiosks are provided for each



A general view of the 132-kV circuit breakers and isolating switches on the feeder side of the Ribble sub-station

Modern Steel Developments. By L. Sanderson

IF the grave industrial depression of the last eighteen months has reduced expenditure on research into steels, it has not wholly arrested progress, and numerous advances have been made during the last twelve months or so that must interest and possess significance for the electrical engineer.

Perhaps the most striking is the astonishing advance in steels for the production of permanent magnets, which has become one of the most active sections of the British steel industry. No fewer than seven different kinds of alloy steels are being used for magnets for loud speakers, electrical instruments, electrical compasses, measuring devices, and similar apparatus.

To-day the importance of using steels of maximum B/H loop value is fully appreciated, for the hysteresis loss is proportional to the area of the loop formed by plotting the magnetic flux density per sq. cm. (B) of the material against the magnetising force (H) taken through a complete cycle.

Previously designers demanded steels of maximum remanent flux per unit area of cross section. This was why tungsten and chrome steels were principally supplied for magnets, but modern needs have led to the introduction of steels containing that rare alloy, cobalt, in varying percentages, beginning with a content of 3 per cent. cobalt and ranging through six, nine and fifteen to the thirty-five per cent. cobalt steels. Tungsten and chrome steels are still being used for magnets, but only when cheapness is the main essential.

There has been little change in the composition or mechanical properties of the dynamo magnet steel castings used for motor-cases, &c., but it is important to note that fabricated work is being increasingly employed in this connection instead of castings. Sections welded together to form the complete body, or other part required, are less costly to manufacture and less weighty.

Electrically welding ends of super-high-speed steel to alloy steel shanks to form cutting tools

Steel Alloy Progress

There have been some astonishing alloy steel developments. One of the most notable is the production of a series of steels for the aluminium die-casting industry. The trouble with steel dies for aluminum work has always been a certain surface-cracking, due to recurrent expansion and contraction of the surface layer of steel to a point at which fatigue sets in. This, together with corrosion and erosion, plus a mechanical wedging action of alloy fins in these cracks, caused eventual failure of the die. During the period under review, this trouble has been completely overcome. Steels containing chromium in high proportions together with other alloys have been found satisfactory, and as many as twenty thousand aluminium die castings have been produced by a single pair of dies manufactured from a steel of this character.

There has probably never been a period in which the grave subject of corrosion has received more attention. Enormous strides have been made in corrosion-resistant steels, with the result that corrosion losses have been greatly diminished, if not completely eliminated. The well-known 18-8 chromium nickel type of stainless steels is developing so as to extend its uses into many fields where beauty and resistance to atmospheric oxidation and corrosion are desired. Electric cooker makers, for example, are beginning to employ these materials because of the insistence in the food world generally on complete freedom from rust, contamination, or oxidation.

In addition a series of steels is being produced for purposes requiring a shining or silver finish, combined with corrosion-resistance and easy working characteristics. This series is the 18-8 chromium manganese steels containing 17-19 per cent. of chromium, 5-10 per cent. of manganese, and copper or copper and nickel in small percentages. Slight alterations in the analyses of these steels will enable castings or wrought articles to be produced, while working up into plates, sheets, bars, strips, seamless tubing, and rods is perfectly practicable. Wire-drawing, cold-drawing, turning, drilling, cutting, sawing and threading can all be performed when these steels are in the annealed or softened state. High resistance to gases containing sulphur at high temperatures, and to acids of various kinds, is offered by these materials.

Another interesting development is the production of alloy steels containing 4-6 per cent. chromium for use when low price, together with a fair degree of corrosion-resistance, is required. While not so good as the stainless steels proper for this purpose, these steels last very much longer than carbon steels. Concrete reinforcing rods have been made of them, for example, and used in the construction of hydro-electric dams with highly gratifying results.

Turning to cutting steels and compounds, of importance in production work, perhaps the leading development is the increasing use by the larger steel works of the high-frequency electric crucible furnace process for the manufacture of fine tool steels. When first pioneered for this purpose by an enterprising British firm some years ago, many doubts were expressed whether the process would prove economically advantageous and technically successful. The reply is seen in the fact that works after works has put down similar furnaces, both in this country and on the Continent. The process has proved itself excellently adapted to the production of cobalt magnet steels mentioned earlier. For example, the largest permanent magnet in the world, made for beta-ray spectroscopy research in the Cavendish Laboratories, Cambridge, by a Sheffield steel works, was made of steel melted in a furnace of this type. The old eighteenth-century crucible steel-making process can be regarded as obsolescent, if not quite obsolete.

The success of the process is due to the complete absence of contact with fuel, the steel being melted by high-frequency currents induced in the steel itself. No coke or gas, as in the older process, and no carbon arc, as in the electric arc-furnace processes, come into contact with the steel, so that extraneous impurities are eliminated. Furthermore, a violent electrical agitation of the bath causes the complete diffusion of the heavy alloys, *e.g.*, cobalt, molybdenum,&c., which in the Huntsman process tended to sink to the bottom. The result is a more homogeneous steel with all elements completely diffused. A further advantage is closer control of temperature, while the steel is made under cleaner, safer, quicker, and less laborious conditions altogether.

It will thus be appreciated that the steel industry has not stood still during the year, and if better times arrive it can be fairly safely said that the forthcoming twelve months will witness even more sensational developments of considerable interest to industrialists.

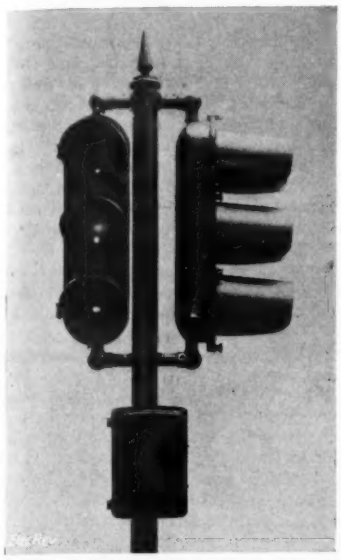
The North-West Grid (*Continued from page 319*)

breaker, the connections from the solenoids being taken to junction boxes. These junction boxes are small outdoor kiosks fitted with glands and sealing boxes carried on a plate which divides a compartment open to the trench from a completely watertight chamber in which the connections are actually made. Heating is provided in the kiosks to guard against condensation of moisture. From the junction-box kiosks a trunk multicore, which collects all the individual solenoid, &c., connections, is taken to the control panels. The control board itself is of the sheet-steel totally enclosed cubicle type, fitted with dust-tight hinged access doors at the rear. The control panels are sheet-steel fronted, and have a dull black cellulose finish with stove enamelled beading. A mimic diagram in white metal strip is provided at the top of the board. Semaphore indicators are of the lamp type and in addition to showing positions of oil circuit breakers, give indication in case of failure of auxiliary supply.

The 132,000-V isolating switches are of the centre rotating type carried by a robust supporting structure of reinforced concrete. Single and double type isolators are installed, the double type comprising five insulator posts, the centre post being common to two isolating switches. Operating mechanisms are totally enclosed and mounted on the concrete uprights. The Castell key system of interlocks is employed between circuit breakers, isolating switches and earthing switches.

Automatic Traffic Signals

SINCE the first all-British automatic traffic control equipment was put on the market some years ago by the Holmes-Reyrolle combine, various modifications and improvements have been made in the design to meet the requirements of the Ministry of Transport, and the various local authorities.



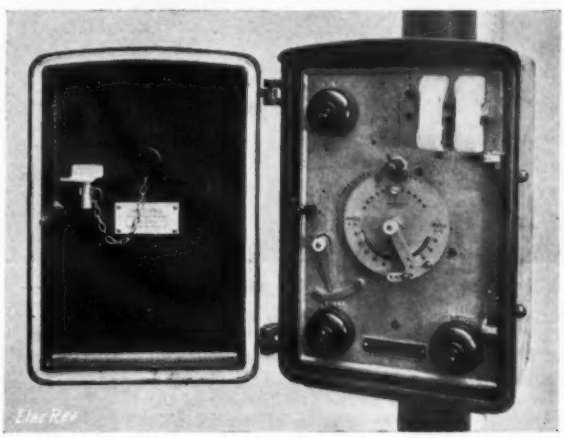
The complete apparatus mounted on a pole

At present a demonstration van is in the London area. The van is fitted up with examples of the latest type of equipment and includes a mimic diagram which, in conjunction with several standard controllers, forms an excellent demonstration of the flexible progressive system of control. The Holmes-Reyrolle method of operating this system is probably unique as it permits a series of intersections along a main traffic artery to be equipped and operated independently of each other in the initial stage; by the mere addition of pilot wires between local controllers the whole scheme can be immediately converted to flexible progressive operation. No separate master controller need be added and the pilots may either be standard Post Office lines or separate lines specially run for the exclusive use of the operating authority.

Silicon-aluminium is used to a large extent in the make up of the lamp boxes and controller. Lamp boxes with lenses of both 8in. and 12in. diameter are marketed, and in each case the lamp is mounted in the most efficient position, i.e., vertically. Particular attention has also been paid to the cowling of the lenses, and in every instance this vital requirement is very efficiently carried out. In the 8-in. size chromium-plated reflectors are fitted, while the 12-in. size has no reflectors but a special optical lens designed to concentrate the top part of the beam and diffuse the lower part. The lamp box is arranged for both horizontal and vertical adjustment and, as multi-way equipments are made by building up groups of units on one pole, the resultant arrangement gives maximum efficiency.

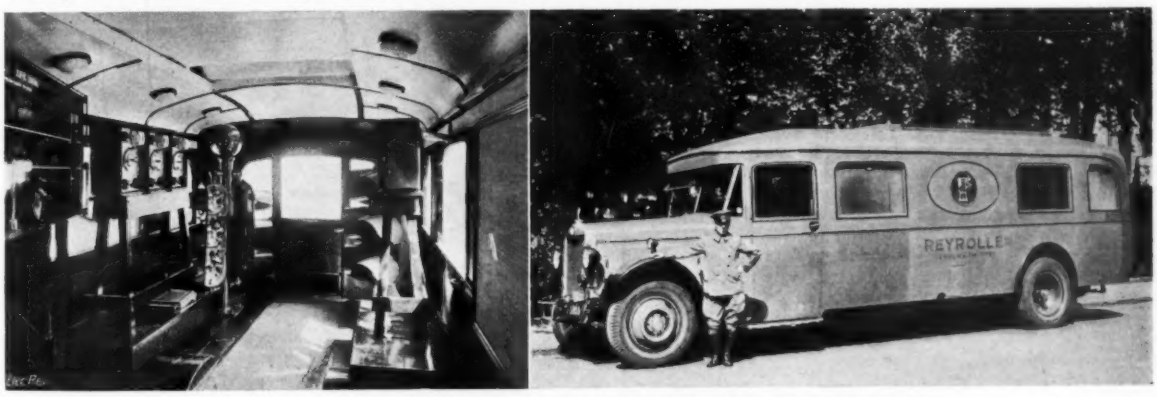
The controller is arranged in a compact weatherproof box and can be either mounted on one of the signal poles, on a wall, or on an independent pedestal. The internal arrangements are such that all live metal is enclosed in earthed metal, and it is impossible for a constable to receive a shock. The various alterations which it is necessary for traffic officers to make are simple and accessible, and improper operation is impossible.

Full provision is made for the operation of the light signals by manual means should the traffic requirements call for this.



The control mechanism

The mechanical and electrical components employed in the controller are all of such a robust nature that maintenance is reduced to a minimum.



Interior and exterior views of the Holmes-Reyrolle traffic signal demonstration van

The Improvement of Hotel Lighting

THE "British Holidays" movement has led to comparisons between the standards and service of Continental hotels with those of similar British establishments which have not always been favourable to the latter.

Although from the hotel visitors' point of view this seems almost tragic, it is clear that to the electrical industry it represents a considerable field for business. The British Electrical Development Association could hardly have found a better subject for the campaign which it is now commencing with the co-operation of the Electric Lamp Manufacturers' Association and the supply and contracting members of the industry.

The points to which attention is directed in this attempt to raise the standard of illumination in British hotels are as follows:—Better lighting in public rooms; more convenient lighting in bedrooms; adequate lighting in ballrooms, vestibules, lounges, &c.; luminous indicator signs in corridors; outside electric signs; lighted canopies; and exterior flood-lighting.

It is shown that not only will hotel keepers benefit by better lighting, but that it will mean more work for contractors, increased revenue for supply undertakings, and greater sales of fittings, lamps, &c. Moreover, it will be a first-class advertisement for electric lighting generally.

The actual "attack" upon hotel managements is timed for October 1st; the intervening weeks will be devoted to the preparation of plans throughout the whole of the country.

A general programme has been drawn up by E.D.A. explaining the nature and scope of the campaign. A mailing list of hotels is being compiled with the assistance of supply authorities and contractors, and the E.D.A. Circles are asked to get together to organise local activities; where Circles do not exist and cannot be found the agencies of supply undertakings are asked to take the initiative in forming Development Centres which will arrange to secure reports upon the condition of lighting in hotels in the area.

These reports after being scrutinised will be forwarded to the hotels concerned with suggestions for improving the illumination; in this connection the illuminating engineering departments of the manufacturers will be willing to render assistance. Lecture-demonstrations for the enlightenment of hotel proprietors should be organised by the Circles.

The hotel proprietors on the E.D.A. list will receive six communications in all. The first will be posted on October 1st, taking the form of a letter and booklet. On October 10th, 17th and 24th three letters stressing various aspects of hotel lighting will be dispatched; on October 31st a letter and handbook on the lighting requirements of hotels will be sent out; and the series will close with a letter, on November 7th, urging immediate action and offering assistance.

Throughout the period advertisements and editorial articles will appear in the hotel trade Press.

Improved Lighting at Scarborough

Electricity replacing gas

ABOUT a year ago it was boasted locally that the street lighting at Scarborough was second only to that in London. This rather vague claim was somewhat discounted by tests which were conducted by the General Electric Co., Ltd., last October at the request of Mr. E. J. Jarvis, the borough electrical engineer. These tests showed that the illumination afforded by gas lamps in a number of the principal streets was capable of considerable improvement.

The foreshore at Scarborough before——

Accordingly, the company was asked to prepare a complete scheme for lighting the main streets and foreshore by electricity, it being suggested that the standards of the tramway system, which was being closed down, would be useful for carrying the necessary lanterns. The scheme prepared put forward totally enclosed "Wembley" lanterns employing non-axial asymmetrical reflectors with "Osram" lamps of from 300 to 1,000 W according to the importance of the thoroughfares.

After considering the proposals, the Scarborough Corporation asked the company to substantiate its claims by practical demonstration, and it was thereupon decided to install the new system upon the foreshore, Westborough and Aberdeen Walk. The work was carried out under Mr. Jarvis's supervision. Upon its completion practically the whole of the Council and its officers inspected the new arrangements and were satisfied that the conversion had brought about a very decided improvement.

The photographs which we reproduce show that the difference between the old and the new methods was very striking, and quite sufficient to convince the Councillors of the necessity for a change over if their town was to maintain its reputation for brightness. It will be seen that under the old system only a narrow strip of the roadway was illuminated, and even central fittings would not have produced the transformation discernible in the other picture.

As a result of these demonstrations the Corporation has now given its approval to the complete conversion of its main street lighting to the "Wembley" system. The process is to be a gradual one, and as fast as the new system is installed so soon will the old system disappear, but if we may judge of what has already been done in this most enterprising Borough, in the scrapping of its tramway and old lighting systems during the past year, it should not be long before electric street lighting reigns supreme throughout its whole area, thus enhancing the attractions of the resort.

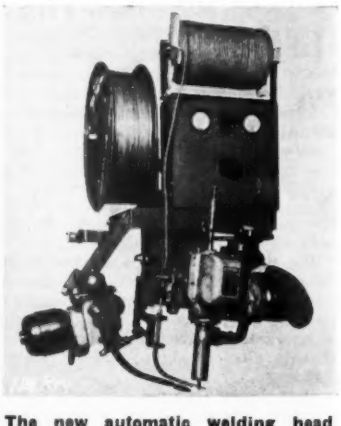
——and after the conversion of the lighting

Automatic Arc Welding

A WIRE feeding head which allows automatic arc welding with the shielded arc process has recently been developed by the Lincoln Electric Co., Cleveland, Ohio, U.S.A. This new automatic welding head is claimed to have very high speed operation on either butt, fillet, or building-up welding, the deposited metal having physical characteristics equal to or better than mild steel.

The shielded arc technique is secured through the use of the "Electronic Tornado" welding head and a fibrous autogeniser which is fed into the arc flame. This autogeniser burns and forms a gas, excluding the oxygen and nitrogen of the atmosphere while the metal is molten. A magnetic field round the carbon arc directs the arc stream on the line of fusion. Full automatic control of the arc maintains the heat constant. The speed of travel of the head can be varied through a wide range, and the amount of metal deposited can be varied to suit the speed of the head and type of weld. Since the rate at which the filler can be fed is varied independent of the speed of the head travel, only one size of filler metal is necessary for any type of work within the range of the machine. The filler metal is usually in strip form which ensures greater accuracy in feeding the metal in the arc. The factors determining the most desirable size and form of the filler metal are ease of handling, compactness of the coils, and minimum disturbance of the arc, and filler strip $\frac{3}{16}$ in. wide by $\frac{1}{8}$ in. thick, provided in 70-lb. coils has been adopted as standard.

Improvements claimed are (1) The filler metal carries no current, and its size is independent of the current—one size of strip can be used from 75 to 500 A; (2) spatter and waste are largely eliminated; (3) the filler strip does not pass through the arc as in metallic welding, but beneath it, and is therefore not subject to the high temperature of the arc stream; and (4) it makes possible a practical method of shielded arc welding where it is desirable or necessary to add filler metal.



The new automatic welding head feeds filler metal into shielded arc

The physical characteristics of the weld are similar to those obtained by other shielded arc methods. A tensile strength ranging from 65,000 to 80,000 lb. per sq. in. is claimed, with a ductility of 20 per cent. or more elongation in 2 in. A resistance to corrosion better than mild steel is also reported, and it is claimed that the range of operation of this new apparatus covers practically all cases in which electric arc welding is applicable.—A. J. T. EYLES.

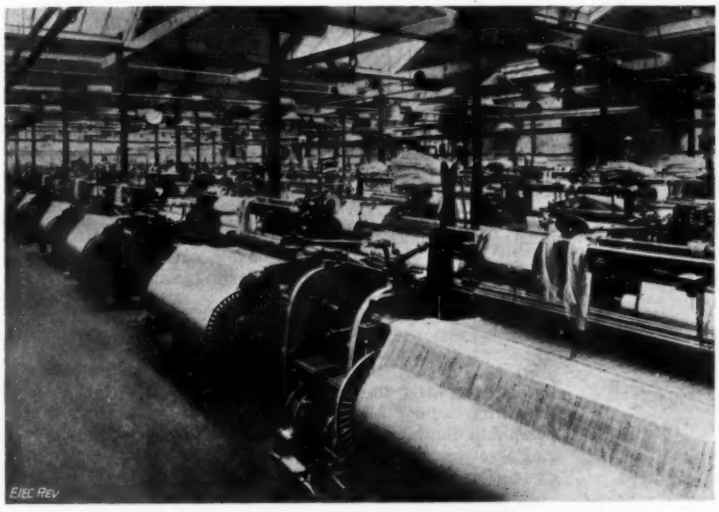
Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Lighting from Power Points

It would be possible to incorporate, as suggested by Mr. C. F. Gage, a load switch somewhat on the principle of a battery "cut-in-and-out"; in fact it is in use by some companies who supply consumers under contract; but there are many objections to the scheme when it comes to using such apparatus for differentiating between power and lighting.

In the first place it is very difficult to tie the use of power down to any pre-determined minimum current. There are so many low consumption articles on the market these days which have every right to be attached to the power plug, but as a result of incorporating such a "cut-out" would be barred, for example, radio sets, small battery chargers, low-temperature heaters, desk fans, hair dryers, etc. Apart from this insurmountable obstacle, Mr. Gage has probably realised that once a piece of apparatus requiring a current of one ampère is switched on, the "cut-out" becomes inoperative. It would almost pay anyone so minded to switch on a load of one ampère in order to reap the benefit of using lighting apparatus from the power system, instead of the more costly lighting circuit.



Electricity in the textile industry: Metro-Vick loom motors in a Lancashire weaving shed

Why not solve the difficulty by pushing ahead with the much more sensible "all-in" rate? J. C. Maitland.

Sidcup, *August 25th*.

Why all this controversy and distress? Surely it is time that supply undertakings ignored the influence of the past and realised that domestic load is not, in 1932, represented by a few lighting points. Below the conclusion of Mr. Arnold's letter in your current issue extremely interesting figures are given relative to the *potential* load of a modern house under the title "All-Electric Houses at Stoke." Mr. Yeaman finds that lighting is approximately three per cent. of the total load when cooking and water-heating are arranged electrically.

Mr. Arnold is right: a flat rate is the only practical tariff if the domestic load is to be properly developed and the "much too expensive" idea is to be driven from the minds of the public.

Three per cent. is not too much to allocate to propaganda purposes in the marketing of a commodity nowadays, and what better propaganda for electricity could one desire than lighting? L. Newton Davey.

Birmingham, *August 29th*.

The Effects of Electric Shock

My experience of electric shock was exactly the same as Mr. D. H. Lindsay's.

It was a warm day and in order to inspect the commutator of a 500-V d.c. generator I climbed inside the guard rail. Holding the top rail I leaned across the pit and touched the commutator. The machine was at rest and, I thought, dead. I immediately felt a shock as if someone had hit me between the shoulders with a sledge hammer, and I found myself sitting in the pit. I felt no ill-effects after.

I was told that I received the shock from the battery, as they were only single-pole switched. I may say I have had many shocks since and have never felt the slightest after-effects.

A. J. Hollington, A.M.I.E.E.

London, E.C.1, *August 29th*.

Consumers' Suggestions

As a consumer of electricity I am grateful for all that is being done to ease the housewife's burden, but what about her husband?

Show him how to use a modest ¼ or ½ h.p. from the mains to dig his back garden and mow his little patch of lawn and I am sure he would be grateful, if it could be accomplished easily and cheaply.

Yeovil, *August 24th*. E. G. Stowell.

The Tax on Electric Vehicles

The Salter Report seems to have been conceived in a genuine desire to protect the railways from unfair competition, but we fail to see how increasing the tax on electric vehicles will help. These vehicles cannot possibly compete with railways but often save them money; the largest users in the world are railway terminals.

The Salter Committee was also, we believe, concerned to see that the Road Fund charges are evenly paid on *all* commercial vehicles upon the highways strictly according to user. If the tax on electric vehicles is raised, we feel sure that the revenue from this class will be reduced, for except in a very few cases (where engine vehicles were being mistakenly used on short, many stop journeys) *all* electrics replace horses. Interference with the present tax will cause a certain amount of reversion to non-tax-paying vehicles as the only alternative. In this connection we know that a great turnover to clean, electric, tax-paying vehicles is just about to take place, and may easily be arrested.

It seems grossly unfair that a one-ton horse outfit, weighing (with the horse) far more than a one-ton electric and costing the community, through its iron tyres, iron shoes, and scavenging, much more, should go scot free. Equity demands that the tax on a one-ton horse vehicle shall be rather greater than on a one-ton electric.

We were large horse owners until we found electric cheaper

Pulverising mills at the Ironbridge power station **(see p. 311)**

to run and gave proper conditions to our drivers. All the time we owned horses we were troubled greatly about the cruelty, inseparable from their use, particularly the universal practice of selling them off, when failing, to almost certain misery.

The Road Fund authorities, with the help of the Salter report, by judicious arrangements between electric and horse transport, can now make a great forward move, help employment, save cost of roads, and increase their revenue.

H. N. OUTRAM, LTD.

August 29th. H. N. Outram, *Managing Director.*

Gas v. Electricity

Perhaps the experience described below will throw some light on the continued popularity of gas for domestic purposes.

I have just moved from one house in Birmingham to another. Before vacating the one I had the meters—gas and electricity—read. No charge was made for this reading by the Gas Department, but I have received a bill "To fee for special reading of meter, 2s. 6d.," from the Electricity Department.

Upon entering the new premises I found two notices, one from each department. The Gas Department notice reads: "It is necessary that the order form herewith shall be signed by the applicant for gas supply and sent to Birmingham Gas Department as early as possible. Prompt attention will oblige," and it is endorsed "Gas left on for you."

The Electricity Department notice reads: " . . . . . Notice having been received of a change of tenancy, the supply to the above premises will be discontinued after 4 o'clock on the 30th day of August unless the incoming tenant attends at the offices of the Electricity Supply Department, 14, Dale End, and signs an agreement for the supply."

I happen to be busy all day struggling to earn my living selling electrical apparatus that builds a load for the Electricity Department, and it is not convenient for me to attend a summons of this kind. I have advised the Department accordingly and now await developments.

August 29th. SALES MANAGER.

Suggested Electrical Engineers' Club

I have read the correspondence on the above subject, which has been appearing in your columns recently, and, whilst I am personally all in favour of such a club in London, I cannot see how this is going to be achieved and made to pay its way.

You doubtless have not received any communication from a late member of the recently defunct Engineers' Club, in Coventry Street, Piccadilly Circus, telling you how that institution was forced to close its doors for "lack of funds" to keep them open, notwithstanding a round robin among its members which it was hoped would keep it going until trade conditions had improved.

This club was not confined to members of the electrical profession (many of whom, especially from the Provinces, were members), but instead was open to engineers generally; yet, with a minimum entrance fee of £10 in addition to the annual subscription, with a licence to sell alcoholic drinks, it had to shut up!

It will doubtless be said by your correspondent Mr. Pegg that he does not contemplate anything so expensive or elaborate as was the late Engineers' Club; but, after all, is it not merely a matter of simple proportion that has to be considered when asking whether his scheme is going to pay its way or not? In the one case, you have a large concern with a large membership; whereas in the other, you have a smaller place, or a less expensive one, with a smaller number of members, many of whom, I venture to think, would not be willing to risk an entrance fee of £10 or £5, if indeed any at all. So where is the money coming from to equip and furnish the club premises, so that it shall offer all the inducements, amenities, and other advantages so glibly mentioned by your correspondents?

I am not by any means a pessimist, but I myself cannot muster up sufficient optimism to enable me to see an Electrical Engineers' Club in London, such as has been suggested, run as a flourishing and lasting concern.

London, W.1., *August 27th.* F. RISCH.

Such a club as that suggested by Mr. Pegg would be a tremendous boon to one like myself who is out of London except for one day a week at the most. I would suggest, however, that the club should be confined to electrical engineers and that charges should be reasonable. Most of us are poor, some of us very poor, and cannot afford to join the "Luncheon Circles" mentioned by your correspondent.

A. J. HOLLINGTON, A.M.I.E.E.

London, E.C.1, *August 29th.*

Aids for the Deaf

A NEW thermionic valve amplifier of small dimensions, which can be prescribed for on a scientific basis similar to that employed by opticians, is the latest aid for deaf people.

It is remarkable how self-conscious such persons become when they begin to use earpieces. The tendency has consequently been to make the receiver so small that it will fit into the auditory cavity, but such severe limitation of size must naturally restrict electro-mechanical design. Compromise is not often entirely satisfactory, but in this case, with the aid of thermionic amplification, it can be made really efficacious.

A new outfit is now available which enables a deaf person to carry on ordinary conversation quite well and is sufficiently small to be readily portable and not particularly conspicuous when in use. In size and appearance the device resembles a small box camera, its dimensions being 7 by 5.5 by 3.5 in. The component parts are a miniature microphone, volume control, transformer, and an Osram DG.2 valve, energised by a 2-V 7-Ah filament accumulator and a 25-V dry anode battery, which are switched in and out of circuit by a jack plug attached to the earphone lead.

The nature of the apparatus suggests that radio retailers and contractors should find such acoustic amplifiers a useful line of business. They do not require skilled manipulation and need little maintenance, the whole object being the magnification of sound to a level at which it becomes audible to the patient.

The technique of telephony has, however, advanced far beyond that stage. It is not only possible, but also desirable in many cases, to change the characteristics of a sound in order that it may be delivered to the ear as an undistorted whole.

For instance, to use the analogy of sight, for correcting some forms of defective vision opticians frequently prescribe deliberately distorting lenses besides plain magnifying and reducing eyeglasses. Now the ear is as delicate an organ as the eye, and therefore deserves the same careful consideration.

Casual selection of an acoustic amplifier at random will not always do, and each ear should be tested as the individual eye is. For this purpose an "Audiograph" has been developed which enables a chart to be plotted of the patient's divergence from normal hearing. The apparatus is made up as a standardised instrument for use by any doctor in his consulting room, or small enough to be portable.

Such a test chart amounts to a prescription, the data so obtained indicating the correct degrees of magnification requisite for individual patients at different frequencies, and enabling each patient's amplifier to be suitably adjusted during construction for correcting any distortion which occurs in the patient's acuity at various frequencies.

By the use of thermionic valve amplifiers Messrs. Radio-Aid, Ltd., 4, Iddesleigh House, Caxton Street, Westminster, S.W.1, not only obtain an advantage in respect of sound magnification, but also simplify the problem of auditory correction, which is of considerable importance in the alleviation of deafness.

Deaf people will be interested in the acoustic amplifier, the external and internal arrangements of which are shown above.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Electric Egg-testing and Candling Lamp

The "Magnet" improved electric egg-testing and candling lamp is an appliance which the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has produced in co-operation with some of the leading egg-testing and packing stations as an efficient method of testing and candling eggs on poultry farms, &c. The apparatus is included in the official list of approved egg testers issued by the Ministry of Agriculture.

The "Magnet" egg-testing and candling lamp

Some of the principal features of the device are that it is fitted with a scientifically designed reflector, which accommodates a standard 40- or 60-W lamp, and that the aperture is lined with an easily renewable padded ring adjustable to an oval or circular shape as required, while the testing hood can be easily set in any desired position. The weighted base has a patent clip for attaching it to the side of egg cases or for fixing to benches or walls. For use from accumulators or motor car batteries a special adaptor can be supplied, while a special model with black enamelled hood for use in egg packing stations is also available. The appliance is fitted with 3-core flexible for earthing purposes. The price is £1 4s.

A 4-in. Scale Flush-type Instrument

The Instrument Department of the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, has recently developed a flush-type instrument for use on switchboards where panel space is restricted. The instrument being round lends itself more readily to variations in grouping than the square type and is just as economical of space. It has been usual to use 2½-in. dial instruments for miniature switchboards, but these are small for practical use and appear insignificant on a group of panels. Choice has, therefore, been made of a larger dial size, 3¾ in., which, utilising the scale features of the new instruments, enables the position of the pointer to be clearly seen at a distance of 30-40 ft. on the 4-in. scale.

A new Metro-Vick ammeter

The case, which is of black moulded bakelite, will accommodate the standard "DL" moving coil and "SL" moving-iron movements. The instruments are designed for one-hole fixing, and may be self-contained up to 60 A for the "DL" and 300 A for the "SL" movement. Voltmeters of both types are made self-contained up to 800 V.

A new dynamometer wattmeter movement has been specially designed for this size. The wattmeter is available in single and polyphase forms, and is self-contained up to 30 A and 150 V. The case has also been adapted for the standard power-factor meter, the window being circular for this type in order to permit readings under both motoring and generating conditions.

The instruments are spring-controlled, are fitted with external zero adjusters, and comply with B.S.S. 89 Grade 1.

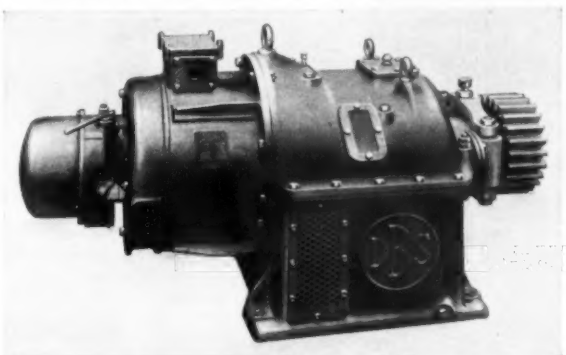
The weight of the 5-A "SL" type is 18 oz. The gross diameter is only 4¾ in., making it possible to mount three units abreast on a panel 15 in. wide. The projection from the front of the switchboard is ¼ in.

Geared Motors

MESSRS. DAVID BROWN & SONS (HUDDERSFIELD), LTD., Park Works, Lockwood, Huddersfield, have recently changed the design of their pericentric helical-geared motor. The coaxial, double-reduction gear of this machine has been specially designed with a view to compactness and accessibility.

The motor body is flange-mounted on an extension of the gear casing (which is horizontally divided) and the drive is taken from the motor-shaft pinion to a second reduction shaft on each side. The slow-speed wheel is also driven from both sides, and has a bearing on each side of it, the whole forming a balanced arrangement reducing bearing pressures on both shafts to a minimum. The unit is especially applicable to high-ratio drives; it is made for either double or triple reductions.

The standard geared motor unit enables a saving in space to be effected, as the electric motor is flange-mounted. It will



A David Brown pericentric helical-geared motor

no doubt find scope in frequency change-overs, as, apart from the above consideration, the arrangement permits direct coupling at any desired speed, independently of the supply frequency.

The vertical-geared unit is another of the types that has been developed by the makers to suit any shaft disposition.

New "Creda" Fires

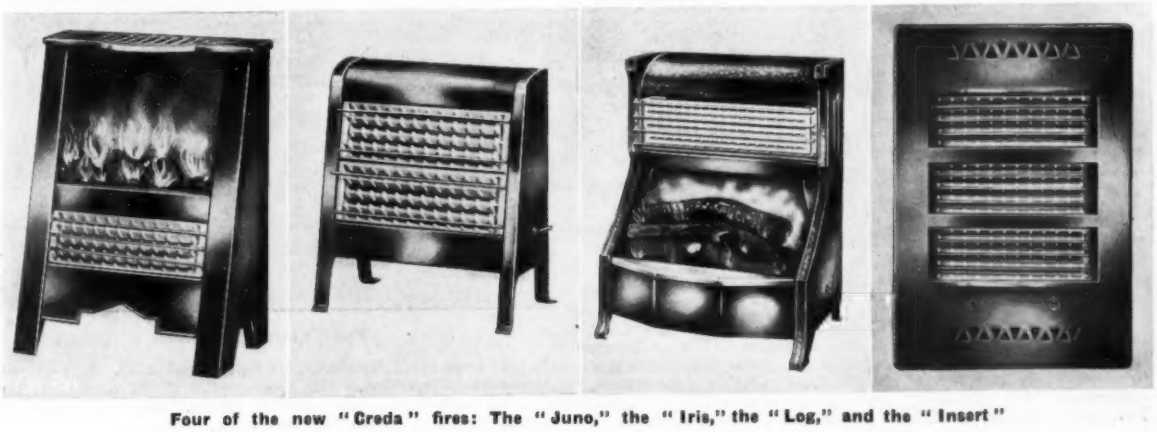
Ten new fires are being marketed by CREDENDA CONDUITS CO., LTD., Oldbury,. The "Juno" and "Jupiter" are two models with a coal fire effect. The former has a loading of 1 kW, weighs 17 lb. and measures 18 by 14 by 8½ in. The "Jupiter" is similar but weighs 2 lb. more, is an inch higher, and has a loading of 2 kW. The "Nestor" 1½-kW coal fire is a well-balanced model of modern design with two heats and a weight of 30 lb.; its dimensions are 24 by 18½ by 11½ in. The "Juno" costs 35s., the "Jupiter" 42s. 6d., and the "Nestor" 50s.

Another interesting newcomer is the "Log" fire; a 2½-kW two-heat model, with the same weight and measurements as the "Nestor." It costs 6 guineas.

There are two "Iris" models, one with a loading of 1 kW costs only 8s. 6d. and weighs 5½ lb., while the 2-kW model costs 16s. 6d., weighs 8¼ lb., and measures 13 by 11¾ by 6 in. The 1-kW model is only 9½ in. high.

A very attractive model of simple design is the "Ajax," a 1½-kW model weighing 13½ lb. and measuring 14 by 14¾ by 4¾ in. It is priced at 27s. 6d. There are two additions to the "Sunstar" models—the "Sunstar I" ¾-kW fire selling at 8s. 6d. with the remarkably low weight of 2 lb., and the "Sunstar III," a 2½-kW 2-heat model, costing 57s.

The new "Insert" fire has been designed with a view to permanent installation in an existing fire-grate opening. There are three models, all of which measure 16 by 14 by 4 in. The 1-kW type costs £1, the 2-kW, 2-heat type sells at 32s., and the 3-kW model at 44s.



Four of the new "Creda" fires: The "Juno," the "Iris," the "Log," and the "Insert"

The British " Eureka " Vacuum Cleaner

As we have already reported MESSRS. A. REYROLLE & CO., LTD., Hebburn-on-Tyne, recently acquired the manufacturing and sales rights of Eureka vacuum cleaners for Great Britain and the Empire. The British-made cleaner is to be supplied by the EUREKA VACUUM CLEANER CO., LTD., 8, Fisher Street, W.C.1.

The " Eureka " is one of the oldest vacuum cleaners on the market and was introduced in Great Britain over twenty-one years ago, but hitherto it has been made entirely in the plant of the Eureka Vacuum Cleaner Co., of Detroit, Mich., U.S.A. The new British Eureka embodies a number of improvements over preceding models, and the machine now being offered is really a combination of the best features of the models formerly selling at 15 gn. and 18 gn. The price of the new cleaner will be 15 gn.

The design of the fan case has been altered to increase the suction of the cleaner, and the handle is detachable so as to make the

The British-made " Eureka "

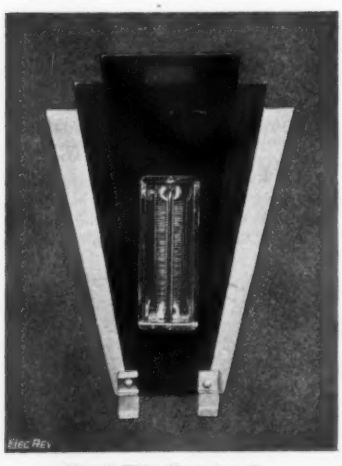
cleaner more portable, enabling it to be used in cramped quarters, such as the interior of motor cars, cupboards, etc. The accessories include an extra length of 25 ft. of flex, which is used to plug in when the handle is removed, and this extra flex can also be used as an extension to the regular handle cord, thereby affording a cleaning radius of 45 ft.

Another important improvement is the floor polisher, and when this is in use a special handle-locking device raises the wheels of the cleaner from the floor so that the polishing is not marred by wheel marks. An interesting part of the accessories is the " Sanitor " attachment for moth-proofing, disinfecting and deodorising. There are, of course, other attachments, such as hose, extension tube, upholstery nozzle, radiator tool, etc.

The company is undertaking an extensive advertising campaign in connection with the improved " Eureka."

Screen Fires

We have received from MESSRS. FRASER & HOWARD, LTD., 22, Ely Place, Holborn, E.C.1, some illustrated particulars of their new " screen fires," which they are about to place on the market.



The " Elite " screen fire

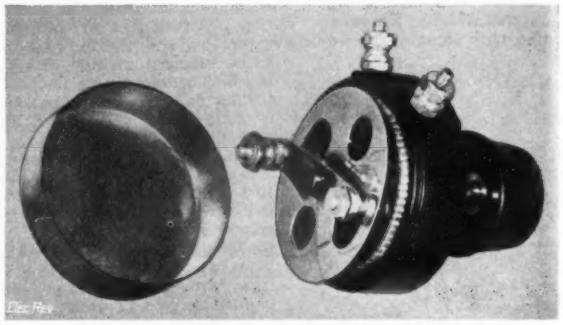
They are made of slate of substantial thickness, which gives the whole screen sufficient weight to prevent any risk of its being knocked over, and are finished in stoved colour enamel. The shapes, designs and colour effects are unique, and they are claimed to be the only radiators on the market which can be supplied to conform with any type of colour or furnishing scheme.

The element is of the " Creda " spiral-bar type, and one- and two-kW fires are supplied. The 1-kW fire costs 40s. (trade price), and the 2-kW fire 53s. 6d., in any shape or colour effect. Our illustration shows the " Elite " model.

High-resistance Variable Potentiometers

THE LONDON ELECTRIC WIRE CO., & SMITH'S, LTD., Church Road, Leyton, E.10, are now producing variable potentiometers to a maximum resistance of 250,000 ohms in either the constant increment or increasing increment (logarithmic) type. Formerly variable resistances above about 50,000 ohms could be obtained only by the use of various types of metallised fabric, treated paper, etc., which was non-homogeneous, and the effective length of such elements was very small.

The advantages of wire wound resistances are well known, but their application up to now has been limited by the



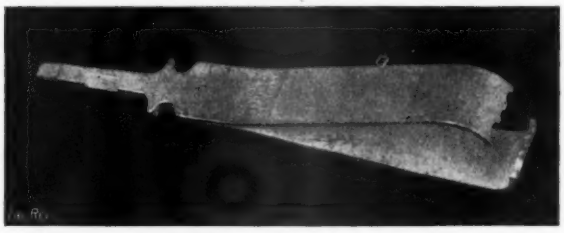
The " Lewcos " potentiometer

maximum resistance which could be wound in a convenient space. The use of double helical winding makes it possible to wind long lengths of wire in a very small compass. The average length of resistance wire in the new " Lewcos " potentiometer is about 500 ft. This is claimed to be the only one of its kind made in the world.

The prices are: constant increment 4s. 6d., increasing increment (logarithmic) 5s. They are made in the following values: 100,000 ohms, 150,000 ohms, 200,000 ohms, 250,000 ohms. The contact is made with the wire by a revolving disc pivoted on the central rod and inclined at an angle. As can be seen from the illustration, this method of contact should eliminate almost all friction against the wire.

A Wire-stripper and Screwdriver

We have received from the RUNBAKEN MAGNETO CO., LTD., 280, Deansgate, Manchester, a sample of new combined insulation stripper and screwdriver. The tool is very light and

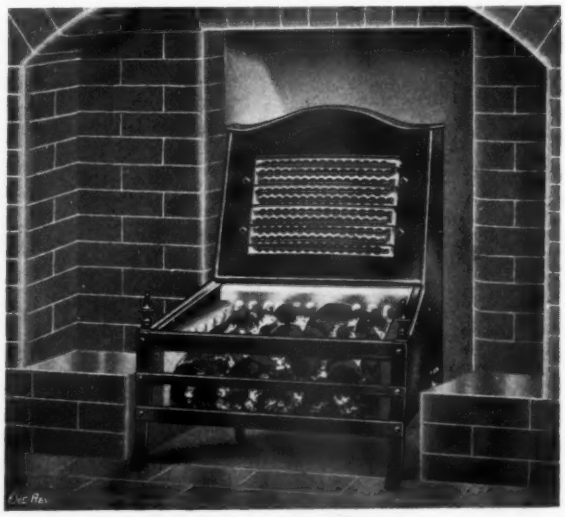


The wire-stripper screwdriver

strong, and there is provision for three different gauges of wire. The retail price is 1s. 6d.

A Radiant Fire

A realistic imitation coal fire is put forward by the ARORA CO., Loughborough, and marketed at £4 19s. 6d., in black finish. The heating elements may be obtained with a loading of 1,000 or 2,000 W with a 2-heat switch, while the lighting lamps are loaded at 90 W. The fire is portable and is designed



The " Arora " coal fire

to give heat in all directions, including foot level. An earthing terminal is provided. The fire weighs 17 lb. and measures 21¼ in. high by 17 in. wide by 12½ in. deep. A chromium plated model is obtainable for £7 10s.

The 1932-33 Lighting Season

LAMP manufacturers are all actively preparing for the coming lighting season, and dealers can count on the fullest co-operation in the matter of advertising campaigns and sales aids. Last week we gave an account of the publicity schemes planned by two companies, and below are reviewed the proposals of some of the other large lamp producers.

Cosmos lamps, which are marketed by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., have very attractive advertising material to support their sales campaign, and the company has produced many sales aids both practical in design and original in appeal. The new catalogue has a striking cover in green and gold and contains many new features including a thumb index, a glossary of lamp and illumination terms, a section describing the advertising material available to dealers, and many new lamps such as the anti-dazzle type for automobiles and opal tubular lamps.

The envelope series folder combines the previous separate folders on general purpose lamps, automobile lamps and decoration lamps, and contains the prices of the most popular types; it may be supplied overprinted with the dealer's name and address. The showcard design introduces a new and catchy slogan, "A Whale of a Lamp," in an original manner. The card, which is 18 ins. high and 12 ins. wide, is well printed, and is provided with a supporting strut and a loop for hanging.

A "Crompton" lamp display suitable for almost any sized window

An attractive cut-out display unit (19 in. wide by 16 in. high) is essentially practical as it includes a pocket for holding a supply of folders. Apart from the above items of general interest, there are showcards and folders available to advertise the new lamps for religious purposes – the "Shrine" and "Remembrance" lamps.

The "Osram" lamp "Butterfly" showcard

The campaign also includes the provision of window displays in the form of painted plywood screens, etc. They are very bright and attractive, the larger displays being supplied with a 30-in. model of "Professor Cosmos," complete with mechanism which causes him to rotate. These displays can be reduced or expanded to suit different sized windows.

The slogan "1s. 6d. is All you Need Pay" is the theme running throughout the new season's "Crompton" advertising matter. Dealers are offered an excellent selection of window display materials. The display illustrated can be adjusted to suit almost any size or shape of window, only 60 W being required for lighting; a most effective result is produced by the alternate lighting of the back panel and the lamp in the hand, an impression being produced of the lamp being thrust forward and offered to the watcher. Another attractive display, which can be obtained from MESSRS. CROMPTON PARKINSON, LTD., requiring 340 W, is suitable for a space 6 ft. high by 6 ft. wide by 4 ft. deep, and is provided with a colour-changing device. For dressing small windows, etc., a centre display measuring about 3 ft. high by 3 ft. wide will prove very useful, while for counter use is a wide choice of cut-outs, display pieces, posters, and showcards. Of particular note is the "Standard Five" cut-out, measuring just under 2 ft. wide and a few inches deep; it takes the five standard lamps and has a pocket for price lists.

There is a variety of literature in the form of catalogues and lists, and new users of electricity will be especially interested in an ingenious lamp-shaped card indicating the correct lamp to use in each room of the house.

The propaganda of the GENERAL ELECTRIC CO., LTD., is in every way up to the company's usual high standard.

The season's campaign, as usual, is the subject of a strikingly designed broadside, containing a quantity of useful information on the subject of electric lamp sales. The dealer's sales aids and literature, which are available for overprinting, together with window showcards, strike a new note of appeal. This year the design consists of a yellow butterfly being drawn to, and settling on, an "Osram" lamp—symbolical of the attraction of light. The literature contains interesting and convincing lighting information, which should bring along good business.

There are one or two new types of lamps that should prove popular, such as the "Osram" internally colour-sprayed range of decorative lighting lamps, and the opal tubular lamps with b.c. caps for use with pendants, ceiling fittings, wall brackets and table standards. The new "Osram" internally colour-sprayed lamps have been used in schemes at various seaside resorts, and they are also useful for sign work and domestic interior colour lighting.

A comprehensive range of sales aids is offered by MESSRS. PHILIPS LAMPS, LTD., whose slogan, "Use Philips Lamps and See," is still featured prominently in advertisements.

Three showcards, 18 by 12 ins., depict in bright and colourful settings pearl, "Argenta" and "Duo-Savelite" lamps, while mirrors, each bearing a Philips advertisement, are being disposed of in thousands. Two coloured showpieces, 3 ft. 6 in. by 2 ft. 4 in., and a lamp stand, 13 by 15 ins., have been specially designed for window display purposes, and a large size lamp cut-out is also available.

For automobile lamps, special displays and transparencies have been prepared, and the well-known "Philips Auto Boy" cut-out is being widely distributed.

Special assistance is rendered by the UNIVERSAL ELECTRIC LAMP CO., LTD., in connection with any particular lamp displays by dealers and Press publicity in local newspapers is arranged. One of the main displays prepared by the company is the "Theatre Stage," showing the "Britram Economy Six," portrayed by figures of pierrots and dancing girls. Attractive showcards, stickers and price lists are obtainable.

For the purpose of catering for the growing needs of its northern distributors this company is opening a branch at 55, Shudehill, Manchester. Besides "Britram" lamps, stocks of electrical accessories will always be available.

Complete details of the BRITISH ELECTRIC TRANSFORMER CO.'s programme and national advertising campaign are contained in the "Kye" broadsheet, and full assistance is offered with regard to special window displays, showcards, posters, etc.

Some of the new "Cosmos" lamp literature

A unique novelty container has been prepared to form a self-contained display for counter or window. This special container holds three lamps and can be cut to make a children's money box—a hint that "Kye" lamps save money; furthermore, the container will sell three lamps at a time.

"I Beg to Apply . . . ." By An Employer

Some hints for applicants for situations

THE task of examining nearly one hundred applications for an advertised vacancy is by no means an easy or congenial one, but it undoubtedly is revealing. Nowadays, when vacancies are scarce and good posts difficult to secure, and the number of candidates for any advertised post is enormous, an applicant should take particular care in stating his case to the best advantage. Few applicants, however, know how to reply to an advertisement.

An analysis of the answers received for a particular position and a few general hints to intending applicants may, therefore, not be amiss. The advertisement in question was of the type seen nearly every week in the technical journals, The particulars were briefly and clearly stated, a definite though fairly common line of experience was specified, a wide age limit allowed, and the salary expected was asked to be stated. It was surprising to find how few applicants had the experience specified and how large a proportion failed to state a salary; most surprising of all, however, was the large number of applications which could only be described as "sloppy."

The colour of the paper on which an application is written may appear to be a triviality, yet it may easily lead to an application being rejected unread. An application written on paper coloured a glaring mauve or sickly pink, folded so that the reader must constantly turn sheets to find the correct sequence of the paper, is likely to annoy the reader and stamp the applicant as unbusinesslike. Yet more than 20 per cent. of the applications under review were written on such paper. Sheets of white paper of reasonable size should be used.

Six of the applications received were almost illegible. It should be remembered that the advertiser has a host of applications to read, and if he finds it necessary to examine words closely before being able to decipher them, the fatal mark of rejection will probably appear on the application before the end is reached. Typed applications are undoubtedly those which catch the reader's eye. Only 17 per cent. of the applications sent in were typed. If, as is generally the case, it is found impossible to type the application, it should be written very carefully, even in the despised "copy-book" style of handwriting. Fifty-three per cent. of the candidates did not clip their sheets together. If fifty applications, say, are received by the morning post, together with a large number of business letters, and the advertiser finds only one half of an application in front of him, he is not likely to institute a search for the missing half.

Read the Advertisement First!

It should scarcely be necessary to say that the particulars of the advertisement should be read carefully. The advertiser has tried to compress his requirements into as few words as possible; hence every word is essential and must be considered. If, as is usual, a definite line of experience is specified, an applicant without that experience is wasting his time in submitting a claim, for there will always be a number of candidates who possess the required experience. (The position is altered somewhat if the advertisement states that certain knowledge or experience is "desirable." In such a case the advertiser would obviously be willing to consider men without that particular experience, if exceptional ability or promise be indicated.) Nevertheless, for the advertisement under review, in which a definite line of experience was specified, only 25 per cent. of the applicants could claim to have had that experience.

Perhaps the commonest and most important fault in applications is vagueness. The advertiser knows definitely what he wants. To tell him that you "have had wide experience in electrical engineering in all branches" means nothing to him. If you go on to specify your experience, such a phrase is superfluous and need not appear. Attempting to hoodwink a man of experience, as the advertiser generally is, will prove useless. For an applicant to say that he has had six months' experience in a drawing office dealing with small motors, and then to proceed to imply that he knows all about the subject (unless backed by particulars of further experience in it), will most certainly not deceive the advertiser. He knows precisely how much can be learned from six months in a D.O. —very useful experience admittedly, but not sufficient to fit the applicant for the post of "sales engineer for small motors, must have good sales record."

The question of salary is probably the most troublesome to an applicant. If the salary is asked for, however, it must be stated. (Only 55 per cent. of the applicants did so.). Each man knows the figure at which it would be worth his while throwing up his job for a new one. If he is called to an interview, he will have an opportunity of discussing the matter in the light of the details he will have gleaned. Whether asked for or not, copies of testimonials should accompany the application, or at least, references given. Only 25 per cent. of the applicants sent testimonials, and very few gave references.

Self-praise no Recommendation

An application should not read like a testimonial from the applicant to himself. There is no need for him to state that he is "a live wire." This does not create the desired impression—rather the reverse, as it sounds bumptious. If the applicant be "a live wire," his record will show it and will be far more convincing than his own word. Nor need he point out that he is "a hard and conscientious worker." The advertiser merely wants to know from the applicant the extent of his knowledge and experience, and such information will allow him to estimate the candidate's worth. The first person should be avoided as much as possible; the applicant should let his knowledge and experience speak for him.

Such, then, are the pitfalls. How can they be avoided? There is one infallible way. All applications should be written in the form of a schedule, under definite headings, the information being given in a logical order, with dates, and in note form. In this way all irrelevant details will of necessity be omitted, the applicant's knowledge and experience, particularly in the line specified, will speak for him, and the reader of the application will be able to form a clear mental picture of the candidate's career without the necessity of wading through a mass of verbiage. The schedule method is also the simplest from the applicant's point of view; awkward formal openings, and stereotyped phrases at the end of the application will thus be avoided. To conclude an application, as most do, with the words "hoping you will give careful consideration to this application and trusting you will grant me an interview at any time suitable to your good selves" forms an anti-climax, and will detract from any good impression made. It is interesting to note that fewer than 15 per cent. of the applications read were in schedule form.

A Suggested Form of Schedule

The schedule can be made to suit the particular case, but should generally be set out along the following lines:—

Name:
Age:
General Education:
(Dates: Name of school.)
Technical Education:
(Dates: Name of college or university, whether day or night studies, and course.)
Certificate or Degree:
(Date when obtained and particulars.)
Grade of I.E.E. Membership:
Experience:
(Let this be the main part of the schedule; split up into sections in the following manner, giving the dates, names of firms, and the type of machinery or goods dealt with in each section; if in charge of others in any section, give details.)
Workshop: Machining—
Assembly—
Test—
Inspection—
Production—
Drawing Office:
Estimating:
Design:
Research:
Sales: Indoor—
Outdoor—(give area covered.)
Other Qualifications:
(Give brief particulars of any other knowledge or experience, such as foreign languages.)
Testimonials:
References:
Salary:

Some of the above sections will naturally be inapplicable and other sections may be added. In any case, all information should be given under definite headings, and in note form. Leave a reasonable margin on the right-hand side of the paper, to allow the reader space for making notes. Applicants must remember to state facts only, to state them clearly, simply and concisely, to omit nothing which will tell in their favour and to add nothing which does not tell of knowledge gained or experience earned. The covering letter should merely state that the application is submitted in connection with such and such an advertisement.

Applications made out in line with the foregoing hints would prove a boon to the advertiser and, what is far more important, would greatly enhance the applicant's chances.

Electricity in Mining

Reports of the Mines Department for 1931*

THE world output of coal in 1931 from 2,243 mines in all was one-eighth lower than in 1930. The British output was nearly one-tenth lower at 220 million tons, due not only to the general decline in the demand but also to restrictions on imports imposed by other countries; cargo and bunker shipments abroad amounted to 61.65 million tons at an average price of 16s. 3d. per ton f.o.b. compared with 75.1 million tons in 1930 at 16s. 8d. The Board of Trade index of industrial production was 9.3 per cent lower than in 1930, which was reflected in a reduction of tonnage of coal from 166¼ million to 155⅝ million tons at 14s. per ton at the pit—1d. less than in 1930. The demands for electricity works, gas works, and locomotives were about the same as in the previous year at 9.61, 16.69, and 12.27 million tons, respectively. The number of men employed was about 184,000 on the surface and 693,000 underground.

In 1912 the h.p. of electric motors was 1.9 per 1,000 tons raised; in 1924, 5.4; and in 1931, 8.2 Greater use is being made of electricity for winding, pumping, and ventilation, as well as for coal cutters, conveyors, loaders and other portable machinery.

Electrically Driven Machinery

There were 40,682 motors in use in the 1,409 electrically equipped collieries with an aggregate capacity of 1,833,536 h.p. The following machinery was driven by such motors, the total h.p. being given in each case. Below ground: haulage, 398,944; conveyors and loaders, 25,313; pumping, 397,332; portable coal cutters, 110,476; other portable plant, 1,891; auxiliary ventilation, 7,805; miscellaneous, 19,160; total 960.921. At the surface: winding, 160,307; ventilation, 121,094; haulage, 79,422; coal washing or screening, 166,569; miscellaneous, 345,223; total 872,615.

Coal cutting machines to the number of 7,371 were in use in 846 collieries. Of these 4,026 were operated by electricity and the remainder by compressed air. About 35 per cent. of the entire output in 1931 was cut by machinery compared with 19 per cent. in 1924; 73 per cent. of the coal cutters, excluding percussive machines, were electrically driven. Conveyors were in use in 502 mines (483 in 1930). Of the total number of 3,883, about 2,000 were driven by electric motors. More than one-fifth of the total output was mechanically transported, half of this by electricity. The number of wet cleaning plants in use has declined, but that of dry cleaning plants has increased; 30 per cent. of the output is treated. In other mines and quarries 95,000 persons were employed—the lowest number since 1918. The selling value of the products fell by 12½ per cent.

Testing Apparatus

The electrical work of the Testing Station at Sheffield has obtained data for the British Standards Institution for a specification for 2½ and 4-V bulbs for safety lamps. Tests have been carried out at Buxton (since May, 1931) on motors, switchgear, etc., to determine whether the apparatus is robust enough to stand the violence of an explosion of inflammable gas inside the casing, and whether the design is such as to prevent the flame of the explosion from igniting gas outside.

The exclusive use of magneto exploders is no longer required, battery or dynamo exploders being approved also. Nearly 70 per cent. of the shots fired were electrically exploded.

Colliery Lighting

The statutory requirement that safety lamps should be capable of giving an all-round light has been withdrawn, and the fitting of permanent reflectors is allowed. In special cases the lighting of mine roads to within a short distance of the coal face with electricity from the mains without transformation is permitted; formerly the minimum distance was 300 yards from the working face. Floodlighting by the "M-L" air-turbine lamp run from the compressed-air mains is approved.

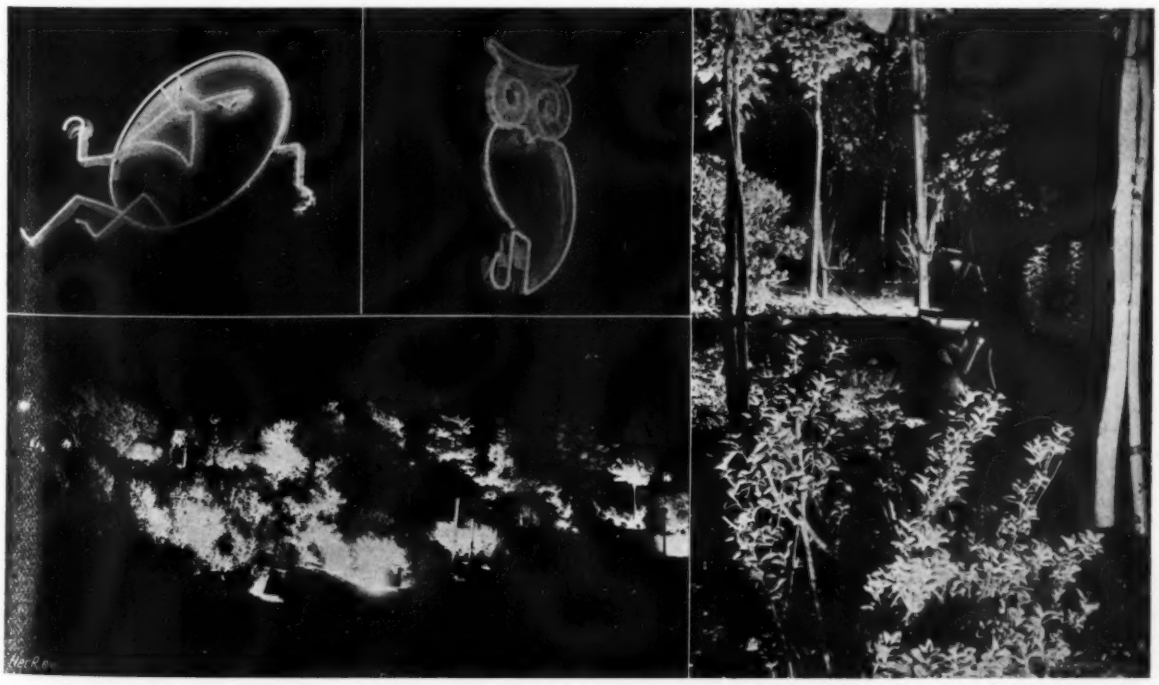
Of the 724,596 safety lamps, 365,645 were electric hand lamps and 21,606 electric cap lamps. The cap lamp is more widely used in Scotland than in England, but its use is spreading in Northumberland and Durham. Safety lamps received their current from 26,831 alkaline, 360,361 lead-acid, and 59 dry batteries. Of the 337,345 non-electric safety lamps, 228,278 were relighted by electricity.

Fewer Electrical Accidents

The number of men killed in coal mines was 859 and 141,471 were injured. Explosions of fire-damp caused 37 deaths and 101 injuries; most of these could have been avoided by the use of safety lamps, but owners and miners seem reluctant to adopt them. Two of these explosions in which 18 men were killed and 3 injured were due to electricity; in one case fire-damp was ignited by the plug of a conveyor motor and the other was due to temporary connections on a fan motor.

Five men were killed by electric shock below ground; in three cases trailing cables and plugs were responsible. The fourth case was that of a non-technical man who attempted to transpose connections, and the fifth was killed while renewing fuses without having switched off the current. One death out of 69 and 6 injuries out of 309 at the surface were due to electricity. There were no fatalities at mines other than collieries.

* Eleventh annual report of the Secretary for Mines and the annual report of the Chief Inspector of Mines for the year ended December 31st, 1931. Stationery Office, 3s. 6d. net.



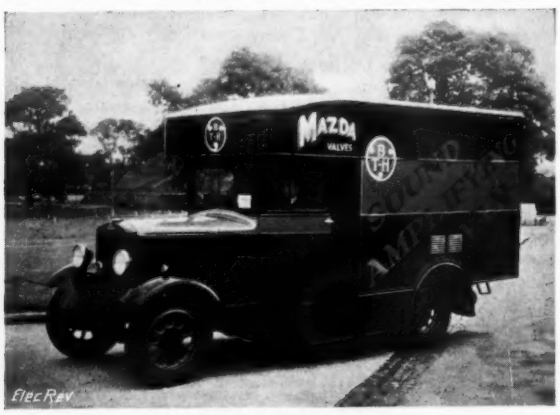
Some of the successful lighting effects arranged in connection with the Carnival being held this week at Southend-on-Sea: Humpty Dumpty and the owl, which are composed of red and blue neon tubing, are installed at the Shrubbery, Spring Hill; the other pictures show portions of the coloured floodlighting at the Westcliff Rock Gardens. **(See page 338.)**

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

A B.T.-H. Sound Amplifying Van

The latest development of the British Thomson-Houston Co., Ltd., in sound amplifying equipments is the mobile sound amplifying van seen in the accompanying illustration. The van, which is attractively painted in black and apple green, has been put into service in order to carry out temporary public address installations, as well as to demonstrate B.T.-H. equipment. It is a 30-cwt. Morris-Commercial vehicle with special body, and is available for use in any part of the country for amplifying speech or music at out-door events. The van is equipped with two 20-W undistorted output all-mains amplifiers, and twelve of the well-known



The B.T.-H. demonstration van

" Type RK " moving coil loudspeakers. Gramophone records may be amplified by a B.T.-H. twin-turntable electric gramophone equipment, and speech by microphone. The loudspeaker and microphone cable is carried on drums, so that they may be operated indoors or at a distance from the van.

The equipment can be operated from any a.c. or d.c. supply, but if no supply is available the equipment may be operated from 110-V power batteries, which are carried in two banks mounted on either side of the chassis. A radio set operated from an aerial concealed in the roof of the van enables British or foreign radio programmes to be broadcast.

Stolen Apparatus

The Automatic Coil Winder and Equipment Co., Ltd., Winder House, Douglas Street, S.W.1, informs us that a universal " Avometer " (numbered 32-375) was stolen from its stand at Olympia during the night of August 24th-25th. The company offers a reward of £50 for its recovery.

A Henley Window Display at Coulsdon

The accompanying illustration shows a window display carried out recently by Messrs. W. T. Henley's Telegraph Works Co., Ltd., for the County of London Electric Supply Co., Ltd., at the latter's showrooms at Coulsdon. The display is intended primarily to draw attention to the merits of the Henley wiring system.

B.T.-H. Rolling Mill Plant for India

The British Thomson-Houston Co., Ltd., has just received an order from Associated Electrical Industries (India), Ltd., for a large synchronous motor to drive a continuous sheet bar and billet rolling mill at the Jamshedpur Works, India, of the Tata Iron and Steel Co. The motor, which is of the totally enclosed type with closed-circuit air cooling, will be rated at 7,500 h.p., 6,300/3,150 V, 50 cycles, 0.8 leading power factor, 93.8 r.p.m., and will be able to take peak loads of 18,750 h.p. In addition, the B.T.-H. Co. is supplying the automatic control gear for starting, reversing and emergency stopping. The motor is claimed to be the largest machine of its kind ever built in Great Britain, the diameter being 26 ft., while the shaft is no less than 2 ft. in diameter.

West Devon Co.'s Carnival Success

The West Devon Electric Supply Co. won first prize at Tavistock Carnival on August 24th in the class for the best tradesmen's exhibit.

Messrs. Davidson's to Make " Aeroto " Fans

Messrs. Davidson & Co., Ltd., Belfast, the well-known makers of " Sirocco " fans, by acquiring the fan patents and trade mark rights of Aeroto, Ltd., formerly of Bush House, W.C.2, and Letchworth, have secured the manufacturing rights for " Aeroto " streamline screw-type fans which have already been widely employed for various duties in ships, and for a variety of industrial uses.

Factory Extensions at Liverpool

Twelve thousand sq. ft. of floor space is being added to the Liverpool factory of Messrs. Wingrove & Rogers, increasing it by approximately one-third. Automatic cadmium plating plant, for rust-proofing the steel parts of condensers, and compressors of various sizes up to 100-tons capacity and other automatic machinery will be installed. The extension will provide employment for a large number of extra hands.

A Telegraph and Telephone Exhibition

An exhibition was opened by the Assistant Postmaster-General, Mr. H. Graham White, M.P., at a Liverpool stores this week to demonstrate the various uses of telegrams, telephones, and radio. The exhibition gives prominence to the latest developments in the telephone and telegraph, and includes a historical section showing the progress of high-speed communications. Demonstrations are given of methods of eliminating radio interference.

Catalogues Required

Mr. H. E. Hunt is starting business as an electrical engineer at 32, Romany Road, Northampton, and asks for factors' and manufacturers' catalogues and showcards, covering installations, radio, and neon sign materials.

Mr. G. E. Evans has opened a new branch at the Station Approach, Lumley Square, Skegness, and asks for catalogues and lists of electrical fittings, etc.

Longer Trolley Wire

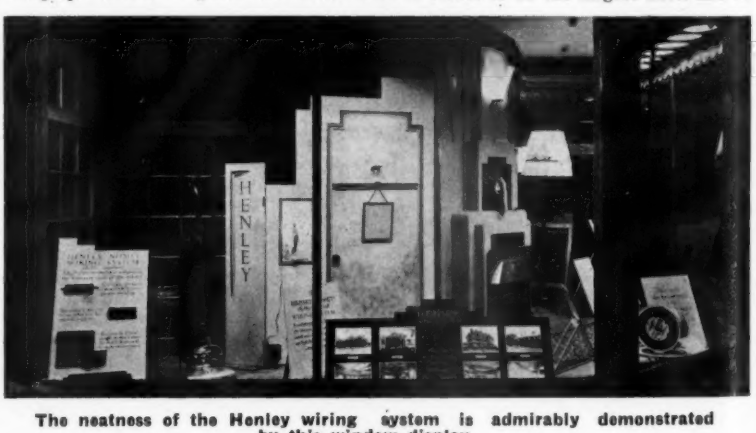
With the object of reducing the number of joints in electric tram and trolley-bus overhead wires, Messrs. Thomas Bolton & Sons, Ltd., have recently adopted as their standard ingot cadmium copper for the manufacture of all sizes of trolley wire, from No. 0000 s.w.g. upwards, a bar which enables them to offer lengths weighing up to 12 cwt. entirely free from joints. The company is thus able to supply half a mile of 4/0 s.w.g. trolley wire in one continuous, unjointed length.

" The Model Engineer " Exhibition

The fourteenth annual Small Power Engineering and Electrical Exhibition was opened at the Royal Horticultural Hall, Westminster, yesterday and will continue until September 10th. In addition to the customary trade exhibits of light machine tools and small power equipment, there is an interesting show of engineering, railways, shipping, and aviation in miniature. In the competition section for the Championship Cup and other prizes entries from all parts of Great Britain have been received.

Recent Contracts

The Hart Accumulator Co., Ltd., has received an order from Messrs. J. Lyons & Co., Ltd., for " Safetylyte " emergency lighting equipment for the Cumberland Palace Hotel, now in course of erection at Marble Arch, W.1, which when completed will cover what is stated to be the largest hotel site in Europe. The equipment will operate off a 415-V, 50-cycle, 3-phase supply and includes a 240-V " Hart " battery, consisting of 120 cells having capacity of 230 Ah when discharged in three hours.



The neatness of the Henley wiring system is admirably demonstrated by this window display

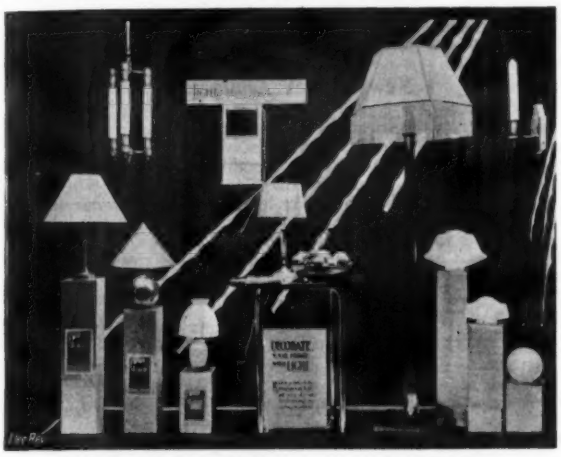
The Southern Railway has placed part contracts for lamps for a period of twelve months with the Metropolitan-Vickers Electrical Co., Ltd., the Edison Swan Electric Co., Ltd., and Siemens Electric Lamps & Supplies, Ltd.

The British Electric Transformer Co., Ltd., has received a contract from the General Post Office for the supply of " Kye " lamps for twelve months.

Orders for private automatic telephone exchanges have recently been received by Standard Telephones & Cables, Ltd., from the Newcastle Co-operative Society for connecting all its branches with the Head Office; the new offices of the Lancashire County Council; the Sharoe Green Hospital, Preston; the Grimsby General Infirmary; and the Manchester Corporation's Electricity Department at Dickenson Street and Polygon Street, these two being of the rotary automatic type.

The E.D.A. September Programme

The September sales and publicity programme issued by the British Electrical Development Association deals principally with the Hotel Lighting Campaign (see page 321 of this issue) and with preparations for the 1932-33 lighting season. Two suggestions for window displays of rather different character are made. The one illustrated is cheap to arrange and utilises various types of illumination fittings with two showcards bearing the legends "Light—Where You Want It!" and "Decorate Your Home With Light." The other display, which is adaptable to windows of all sizes, is even simpler and is specially designed to create interest in modern types of lamps. Full details are also given of new posters and other publicity literature.



One of the E.D.A. September window displays

Salesmanship Conferences

The E.D.A. Salesmanship Conferences in the London area will be held this winter at Caxton Hall, Westminster, on October 14th, November 18th, January 20th, February 17th, and March 17th. Each conference will commence at 7.30 p.m.

Electrical Shot-firing Apparatus

The Secretary for Mines announces that the Wigan No. 5 high tension battery exploder for single shots, manufactured by Messrs. Heyes & Co., Ltd., has been approved for use in all coal mines to which Part II of the Explosives in Coal Mines Order of September 1st, 1913, applies.

Ship Floodlighting Experiments

Floodlighting is to be carried out on the Blue Star liner *Arandora Star* preparatory to her Mediterranean cruise on September 9th. Engineers of the Edison Swan Electric Co., Ltd., are carrying out the work of floodlighting the funnels for use while the ship is in port, and eight 1,000-W "Mars" projectors, specially constructed of aluminium alloy to withstand sea atmosphere, are to be used. One unit on each side of the funnels is equipped with swivel brackets for swinging outboard so that the deck will be lit to facilitate the embarkation and disembarkation of cargo at night time. The final floodlighting scheme will be planned upon the results of these tests.

The Italian Radio Market

Although the Italian radio market is growing rapidly, there does not appear to be any obvious opening for United Kingdom trade, says a confidential report recently issued by the Department of Overseas Trade. Under present tariff conditions there is little hope of doing business in Italy either in receivers or components. Manufacturers in the United Kingdom have never been keenly interested in the Italian market, and it would be very difficult for them to obtain a footing for more than one reason, the most important of which is that British radio receivers and components are practically unknown in the country.

The Dutch Radio Market

A Department of Overseas Trade report on the market for radio apparatus in the Netherlands says that in the opinion of some radio dealers the prices of United Kingdom sets of the type most suitable for this market are already so high as to render their importation prohibitive, so that trade in radio apparatus with Holland may be said to be restricted to components. On account of their efficiency and excellent finish United Kingdom components can find a market in Holland provided the prices are cut to a rock-bottom level and the agents or importers are given every encouragement and support by the manufacturers as regards advertising and service.

American Radio Exports

The exports of radio receiving sets, loudspeakers, valves and other cognate material from the United States during the five months ended with May last attained a value of £1,0o6,650, as compared with £1,633,545 in the corresponding period of last year.

German Radio Exports

Since October, 1931, the German inland sales of radio receivers have perceptibly fallen off, and it is calculated that the turnover in the present year will not reach the level of that in 1931. In the case of the export trade the prospects have become even worse. In 1926 the value of the exports was 36 million marks and the weight about 3,000 tons, these figures rising to 78 million marks and 8,100 tons in 1931. In the first half of 1932 exports have declined by 48 per cent. in quantity and 51 per cent. in value, as compared with the first six months in 1931. In particular exports to England have diminished; in 1930 these exports formed a seventh of the total, but in the first half of this year they represented only one tenth of those in the first half of 1931. Purchases have also decreased in the cases of Italy, Argentina and Sweden, but exports to France have increased. The total value of exports in the first six months of this year is returned at 17.32 million marks, as compared with 35.28 million marks in the corresponding period of last year, while imports have declined from 5.61 to 3.15 million marks.

Italian Electrical Trade

Imports of electrical machinery, apparatus, and cognate material into Italy during the five months ended May last amounted in value to £868,075, as compared with £1,593,270 in the corresponding five months of 1931. On the other hand, exports of similar material during the same period increased from £508,590 to £718,710. The Italian lire have been converted at the rate of 67½ to the £.

Conditions in Latvia

According to a recent Department of Overseas Trade report on the economic and trade conditions in Latvia (Stationery Office, 1s.), the changes in the international money market during the latter part of 1931 have reacted most unfavourably on the development of Latvia and have greatly affected the economic and industrial conditions of the country. Foreign trade returns in 1930 were approximately 17 per cent. less than in 1929, and fell a further 38 per cent. in 1931. The resulting financial stringency caused a marked fall in the purchasing power of the population, with ensuing disturbances in the business world. The position is still grave, and future financial stability depends largely on a balanced budget, an improvement in the balance of trade, and the possibility of increasing the foreign markets for Latvian produce.

An All-electric House at Tamworth

Great success attended the recent opening by the Tamworth Circle of the Electrical Development Association of an all-electric demonstration house at Mile Oak. The house was designed and built to the order of the Tamworth District Electric Supply Co., Ltd., and there was an excellent collection of domestic appliances of the most up-to-date types. A thermostatically controlled panel system of heating was demonstrated, and there were examples of flush-fitting electric fires which could be removed to enable coal fires to be used if desired. Plate warmers, toasters, kettles, cookers, vacuum cleaners, water heaters and various bathroom appliances were among other apparatus installed. The children in the accompanying photograph displayed great keenness to collect E.D.A. literature, and to avoid favouritism they themselves suggested that they should scramble for it.

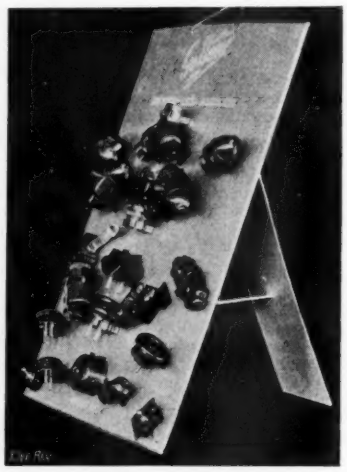
An all-electric house recently opened by the Tamworth E.D.A. Circle

New Swiss Company

The Société de la Fabrique d'Accumulateurs is the name of a new company which has recently been formed at Orient to manufacture electric accumulators on the Degraa method.

A Ward & Goldstone Sales Aid

To assist electrical contractors in making attractive counter and shop-window displays, Messrs. Ward & Goldstone are issuing free of charge the very effective showboard illustrated herewith. It measures 15 by 20 in. and makes a very striking background from which the "Goltone" components stand out boldly. The articles are held by self-adjusting clips, and each display stand is sent out with the components in position. Each component is numbered, and a key to their names is fixed on the back of the stand. Messrs. Ward & Goldstone have recently made large works extensions to provide for an increased output of moulded components, wires, cables, flexible cords, &c. A good assortment of stocks is held at the London depôt at 5, Percy Street, W.1.



The "Goltone" display stand

Hungarian Electrical Imports

During June last the imports of electrical machinery and apparatus into Hungary totalled 89,000 quintals, with a value of 1,737,000 pengös.

Trade Announcements

Harper & Moores Firebrick Co., Ltd., has been formed to acquire and carry on the old-established firebrick business of Messrs. Harper & Moores, Ltd. The services of the former managing director, Mr. V. R. Westcott, have been retained, and the capacity of the company for efficient production has been improved.

The business of Messrs. Norvall Bros., Victoria Grove, N.16, has been converted into a limited company under the style Norvall Bros., Ltd.

Mr. W. Richard Reeve, electrical contractor, has opened showroom premises in North Street, Bourne.

Messrs. L. Smith & Sons, electrical engineers, High Wycombe, have moved to larger premises at Rye Mills, London Road.

The British Aluminium Co., Ltd., announces that the telephone number of its new London warehouse at 23-25, Pancras Road, N.W.1, is North 5301.

Messrs. H. Bibby & Co., electrical contractors, Warrington, have opened new offices and showrooms at Buttermarket Street.

Owing to increased business in "Bastian" electrode boilers Messrs. Bastian & Allen, Ltd., have moved their office and works to larger premises at 12 and 14, Church Road, Hanwell, W.7. (Telephone: Ealing 6733.)

For Sale

Brighton Electricity Department has two Yarrow boilers for sale complete with superheaters, &c.

A 7.5-kVA transformer, now at Ruskin Avenue, Kew, is offered for sale by the Office of Works.

(See our advertisement pages to-day.)

Drumm Battery Developments

Following the success of the No. 2 Drumm train, the *Irish Independent* states that arrangements are now about to be made for the manufacture of the battery on a commercial basis. Other countries have now become interested in the invention, and there is every likelihood of extensive developments in the use of the battery outside the Free State.

New Electrical Showrooms

The Bournemouth & Poole Electricity Supply Co., Ltd., is having new showrooms and offices erected in Yelverton Road, Bournemouth.

New French Companies

Among the new concerns recently organised in France are the Société de Fabrication d'Appareillage Electrique et Disjoncteurs Automatiques Stotz, Paris (25 Rue de l'Entrepot), to acquire and exploit the French rights in the Stotz (German) automatic circuit breaker; La Compagnie Générale pour l'Eclairage et le Chauffage par le Gaz et l'Electricité (Gazeline), Paris (24 Boulevard des Capucines); La Société d'Applications Mécaniques Electriques et Hydrauliques, Paris (116 Avenue des Champs Elysées); La Société d'Etudes Hydro-Electriques du Centre, Paris (5 Rue Saint Georges); and La Société d'Exploitation du Secteurs Electriques du Sud-Ouest, Tarbes (58 Rue Georges Clemenceau).

Transport Development at Liverpool

An interesting transport development has recently been introduced at Liverpool by arrangement between the L.M.S. Railway and Messrs. Tate & Lyle, Ltd. From the latter's refinery in Love Lane an electric overhead belt conveyor has been installed to carry bags of sugar to a new railway loading platform near Great Howard Street goods station. The conveyor, which has a total length of over 300 ft., passes at a height of 38 ft. over Love Lane and the railway main line viaduct leading out of the Exchange Station, and along Little Howard Street. Some 500 bags of sugar can be transported over the conveyor and loaded into wagons every hour, the conveyor thus providing what, in effect, is a private railway siding which could not be provided in the usual way owing to the refinery being separated from the siding by a busy street and a viaduct carrying four electrified lines of railway.

A showpiece for Philips lamp window displays **(see page 327)**

Power Station Staffs' Salaries

As we are constantly receiving inquiries regarding the salaries payable to the staffs of electricity supply undertakings, we think that the subjoined table setting out the scale approved by the National Joint Board of Employers and Staff Members will be of interest and utility. Further information upon salaries and conditions can be obtained from the general secretary of the Electrical Power Engineers' Association, 102, St. George's Square, London, S.W.1.

It should be noted that the scale represents a deduction of 16 points from the basic salaries fixed in 1923. Employés in the London area are entitled to an addition of 5 per cent. to the schedule rates. In any district where conditions justify lower remuneration a deduction of 5 per cent. can be made by mutual agreement.

Title of Grade.	Grade.	Class A 1,000—2,000 kW.	Class B 2,001—4,000 kW.	Class C 4,001—6,000 kW.	Class D 6,001—8,000 kW.	Class E 8,001—13,000 kW.	Class F 13,001—25,000 kW.	Class G 25,001—50,000 kW.	Class H 50,001—100,000 kW.	Class J 100,001 kW and over.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Deputy Chief Official	1	461 6 0	495 8 0	543 14 0	574 0 0	—	—	—	—	—
	2	397 18 0	427 5 0	369 17 0	497 6 0	538 19 0	—	—	—	—
Power Station Supt. Mains Supt. (with charge of sub-station).	3	356 5 0	382 15 0	423 9 0	447 2 0	485 19 0	505 16 0	543 14 0	586 6 0	645 0 0
Mains Supt. (without charge of sub-station).	4	303 4 0	337 6 0	360 19 0	396 0 0	429 3 0	448 1 0	496 7 0	530 9 0	574 0 0
	5	285 5 0	309 17 0	341 2 0	361 18 0	392 4 0	424 8 0	442 8 0	486 18 0	516 5 0
	6	256 17 0	287 2 0	307 19 0	337 6 0	355 6 0	384 13 0	412 2 0	440 10 0	483 2 0
	7	230 10 0	256 17 0	287 2 0	303 4 0	329 15 0	356 5 0	370 9 0	410 4 0	433 17 0
Shift Charge Engineer	8	230 10 0	230 10 0	256 17 0	282 8 0	297 11 0	323 2 0	345 16 0	359 1 0	394 2 0
	8a	214 0 0	214 0 0	234 9 0	256 17 0	273 17 0	297 11 0	319 6 0	334 9 0	364 15 0
	8b	198 5 0	198 5 0	216 7 0	232 17 0	250 4 0	272 18 0	292 16 0	310 16 0	336 7 0
	9	—	—	198 5 0	212 8 0	228 19 0	248 6 0	267 5 0	287 2 0	307 19 0
	9a	—	—	—	198 5 0	213 4 0	221 17 0	235 5 0	254 0 0	275 15 0
	10	—	—	—	—	198 5 0	198 5 0	209 5 0	223 9 0	244 10 0
	10a	—	—	—	—	—	—	198 5 0	212 8 0	228 3 0
	10b	—	—	—	—	—	—	—	198 5 0	212 8 0
	10c	—	—	—	—	—	—	—	—	198 5 0

Amplification for Theatres

The flexibility of the modern electrical amplifier is well demonstrated by an installation that has recently been made in the Shaftesbury Theatre, London, by the Gramophone Co., Ltd. A standard double-turntable machine, with specially constructed pick-ups having engraved scales in order that any single groove on a record can be easily located, has been installed in conjunction with a high-power amplifier and seven loudspeakers. Besides providing interval music from the orchestra pit, a large number of effects and "noises off" are provided by records. Additional loudspeakers have been installed in the entrance foyers and bars, and the audience is warned by an announcement, *via* a microphone, when the curtain is about to rise. Theatrical critics commented in their reviews of the new play on the realistic stage effects, and the results that have been achieved.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Aug. 31st.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	5½d.	—
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3½d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£95 to £100	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£136	—
Grade II ... ... ,,	£96	—
Grade III ... ... ,,	£52	—
c Brass (rolled metal 2" to 12" basis)... per lb.	7½d.	½d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9½d.	—
c ,, Wire, basis ... ... ,,	7¾d.	½d. inc.
c Copper Tubes (solid drawn) ... ... ,,	10d.	—
g ,, Bars (best selected) ... ... per ton	£65	£3 inc.
g ,, Sheet ... ... ,,	£65	
g ,, Rod ... ... ,,	£65	
g ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£42	£6 inc.
d ,, ,, H.C. Wire ... per lb.	6½d.	¾d. inc.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£15	£2 inc.
g Mercury ... ... per bot.	£9 7s. 6d. to £9 12s. 6d.	2s. 6d. dec.
e Mica (in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10½d.	—
p ,, ,, rolled strip & sheet ,,	10½d.	—
p ,, ,, wire ... ... ,,	11½d.	—
o Platinum ... ... per oz.	£9 15s.	—
d Silicium Bronze Wire... ... ... per lb.	7½d.	—
r Steel, magnet, in bars... ... ... ,,	7¼d.	—
g Tin, Block (English) ... ... per ton	£151 to £153	£5 15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co. Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

New Catalogues and Lists

Theodore R. N. Gerdes, 105/107, Bank Street, New York.—An illustrated leaflet describing the "Gerdes" method of ventilation.

Wardle Engineering Co., Ltd., Old Trafford, Manchester.—Booklet No. L. 558, relating to "Prismot" lighting fittings. Owing to increased production prices have been considerably reduced, and the trade discount has been increased.

Whitworth Electric Lamp Co., Ltd., 6-8, Gorleston Street, West Kensington, W.14.—The new season's catalogue of cables, general electrical and radio equipment and accessories.

Gent & Co., Ltd., Faraday Works, Leicester.—Leaflet No. 162d announcing reductions in the prices of "Tangent" metal-clad bells.

Venner Time Switches, Ltd., Kingston By-pass Road, New Malden.—Circulars relating to the fixed-plus-running charge prepayment meters.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Several illustrated booklets dealing with radio devices and sound amplifying and reproducing equipment.

Wandsworth Electrical Manufacturing Co., Ltd., Imperial Works, Kenyon Street, Birmingham.—A 48-page illustrated catalogue of electrical accessories.

Power Plant Co., Ltd., West Drayton, Middlesex.—A calendar for September containing a generous supply of squared paper.

Koch & Sterzel A.G., Dresden.—A complete catalogue of over 100 pages dealing with medical apparatus.

Electric Fires, Ltd., Heatrae Works, Norwich.—A 60-page illustrated booklet describing the new season's "Heatrae" domestic electrical appliances.

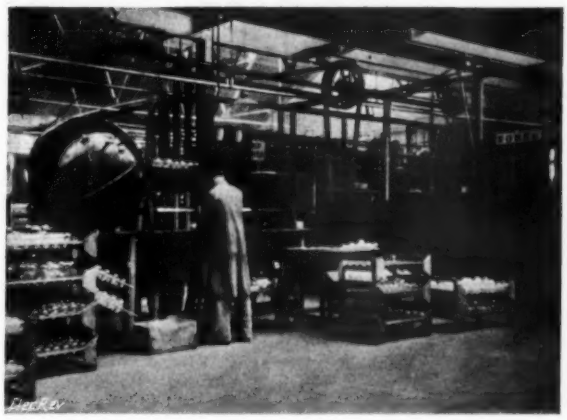
Switchgear & Equipment, Ltd., Banbury.—A folder indicating the points in favour of the "S.E." pull-down switch fuse.

Hall & Pickles, Ltd., Port Street, Manchester.—A sectionalised catalogue of "Hydra" tool steels.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Several leaflets relating to miniature "Pivaspring" instruments (formerly manufactured by the Park Royal Engineering Co., Ltd.).

Power Contracts (Batwin), Ltd., 138, Southwark Street, S.E.1.—An illustrated leaflet describing new British "Batwin" motors.

Provincial Incandescent Fittings Co., Ltd., Pifco House, High Street, Manchester.—The company's new season's general catalogue of electrical apparatus and fittings. It has 132 pages and is copiously illustrated.



Lamp testing at the Universal Lamp Co.'s factory, Acton

British Brown-Boveri, Ltd., 56, Victoria Street, S.W.1.—Particulars of a new series of Brown-Boveri circuit breakers.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—A loose-leaf binder containing detailed particulars of the "Osram" radio valves now on the market. A thumb index facilitates reference.

Cressall Manufacturing Co., 31 and 32, Tower Street, Birmingham.—An illustrated list (No. 39) of sliding resistances.

Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester.—The new season's catalogue (No. R/128) of "Goltone" radio apparatus and accessories.

Ozonair, Ltd., St. Leonard Street, S.W.1.—Pamphlet No. 7A describing "Ozonair" apparatus for therapeutical applications.

Premier Gas Engine Co., Ltd., Sandiacre, near Nottingham.—Publication No. 1458 dealing with the latest applications of Crossley-Premier horizontal engines.

Phœnix Telephone & Electric Works, Ltd., 38, Newman Street, W.1.—A circular (Publication No. 105) relating to a high note buzzer made of moulded "Bakelite."

Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.—The August "Wigan Review" containing particulars of the "Wigan" flameproof well glass fitting.

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, W.C.2.——Leaflets G. 577/4, C.R. 1 and C.R. 2, describing recent improvements in cathode ray oscillograph equipment.

Wm. Sanders & Co., Wednesbury, Staffs.—A folder relating to the "Sandaline" fuseboard.

Alliance Wholesale, Ltd., 62, Great Russell Street, W.C.1.—A leaflet giving details of an electrically heated sealing wax melter.

Mullard Wireless Service Co., Ltd., Charing Cross Road, W.C.2.—Two leaflets on 2-volt and a.c. mains valves, giving a brief description and full technical data on each of the principal types. Also a new edition of the company's general valve catalogue.

Bankruptcy Proceedings

J. I. Dangerfield (trading as "Dangerfields"), wireless and electrical engineer, 25, New Street, West Bromwich.—The first meeting of creditors was held at the Official Receiver's Office, 191, Corporation Street, Birmingham, on August 18th. The debtor had prepared a statement of affairs which showed ranking liabilities of £1,463, while the assets of £149 were absorbed by preferential claims. The failure was ascribed to "insufficient capital, interest on loans, law costs, bad trade, inability to supervise business properly owing to illness, and depreciation of effects." The debtor said that the business had at no time been successful, and he would have been unable to carry on without financial assistance. The case being a summary one was left in the hands of the Official Receiver as trustee of the estate.

G. W. Lambert, electrician, Ontario Street, Southwark.—This debtor attended last week at the London Bankruptcy Court and passed his public examination upon accounts showing liabilities of £210 against assets of £16. He attributed his failure to general trade depression and insufficiency of profits to cover overhead expenses and drawings.

L. G. H. Cantle, wireless engineer, Woodbury Cottage, Woodland Grove, Oatlands Park, Weybridge.—First meeting, August 29th, at 29, Russell Square, W.C. Public examination, October 11th, at the Kingston Police and County Court.

H. W. Martin (trading as the London Radio Co.), wireless engineer, 209, Moulsham Street, Chelmsford.—First meeting, September 9th, at 29, Russell Square, W.C.1. Public examination, November 2nd, at the Shire Hall, Chelmsford.

T. S. Moore, electrical engineer, 29, Myrtle Street, Liverpool.—Last day for receiving proofs for dividends, September 10th. Trustee, Mr. J. Allcorn, Government Buildings, Victoria Street, Liverpool.

R. F. Davis, electrical engineer, 21, Derringham Street, Hull.—Last day for receiving proofs for dividend September 7th. Trustee, Mr. J. E. D. Stickney, 37, Scale Lane, Hull, Official Receiver.

C. G. Smith, electrical contractor, 66, Lichfield Street, Wolverhampton.—Last day for receiving proofs for dividend, September 3rd. Trustee, Mr. A. E. Lacon, 14, Lichfield Street, Wolverhampton.

Company Liquidations

Weenen, Goddard & Co., Ltd., electrical engineers, Leather Lane, Holborn, W.C.—The statutory meeting of creditors was held recently at the offices of the company. According to a statement of affairs submitted the liabilities were £1,967, all due to trade creditors, and the total assets £1,076, leaving a deficiency of £891. A resolution was passed appointing Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., liquidator of the company, with a committee of inspection consisting of the representatives of Messrs. E. Dawson & Co., the General Electric Co., Ltd., Falk, Stadelmann & Co., Ltd., Siemens Electric Lamps & Supplies, Ltd., and Crompton Parkinson, Ltd. The principal creditors are:—General Electric Co., Ltd., £548; E. Taylor & Co., £329; Falk, Stadelmann & Co., Ltd., £154; Siemens Electric Lamps & Supplies, Ltd., £153; Philips Lamps, Ltd., £55; Crompton Parkinson, Ltd., £92; Walsall Conduits Co., £59.

Yesly Electrical Supplies, Ltd., electrical and radio dealers, 5a, Iliffe Yard, S.E.17.—The statutory meeting of creditors was held on August 17th at the offices of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C.2, when Mr. Willis, a director of the company, presided, and said that at a meeting of the shareholders held previously a resolution had been passed nominating Mr. W. A. J. Osborne and Mr. E. C. Thorne, of Messrs. Thompson, Gregory, Thorne & Co., as joint liquidators of the company. According to a statement of affairs the liabilities amounted to £3,267, of which £1,812 was due to trade creditors. The assets totalled £1,341, from which had to be deducted preferential claims of £169, leaving net assets of £1,072, or a deficiency as regarded the creditors of £2,195. It was resolved to confirm the appointment of Mr. Osborne and Mr. Thorne as joint liquidators, with a committee of inspection. The following are the principal creditors:—Credenda Conduits, Ltd., £146; Celestion, Ltd., £52; A. C. Cossor, Ltd., £129; Electric Cables, Ltd., £70; General Electric Co., Ltd., £52; J. Gidden & Co., £57; F. Kragelch & Co., £160; London Commercial Electricity Stores, £264.

Bloomsbury Wireless Co., Ltd., 27-28, King William Street, E.C.—The report of the Official Receiver (the liquidator) has been issued together with a summary of accounts showing total liabilities of £417, assets of £150, and a deficiency of £270 with regard to contributories. The company's failure is attributed to a decreased demand for wireless sets and parts, accompanied by severe competition by several neighbouring shops which opened after the company commenced business. The Official Receiver is of opinion that the failure is due to mismanagement.

Western Counties Electrical & Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. A. Collins, 28, Baldwin Street, Bristol.

Private Arrangements

Boyce Bros., Ltd., electrical engineers, 52, High Street, Highgate, London, N.19.—Creditors were called together on August 24th at the Institute of Chartered Accountants, Moorgate Place, E.C. Mr. J. Quinn, secretary of the company, said that the meeting had been called to submit a scheme for the payment of the creditors' claims. The present position had been brought about as the result of the company finding itself temporarily short of working capital. Dealing with the position of the company as at June 30th last, the company's accountants stated that the assets were roughly £1,700, which included floating assets of £1,100. The stock was included in that figure at about £900. The liabilities (all due to the trade) were £723, and there was a small bank overdraft of £80. The issued capital of the company was £2,100. It was suggested that if the company was allowed to continue trading the whole of the debts would be paid in full and the creditors were asked to accept six quarterly payments commencing on January 1st next in settlement of their claims. It was decided that the meeting should be adjourned for seven days and a committee of inspection of three of the principal creditors was appointed to consider the position.

British Pix Co., Ltd.—In the Vacation Court recently Mr. Justice Goddard had before him a petition to sanction a scheme of arrangement. Mr. Berkeley, for the company, said the scheme was between the company and its unsecured creditors in June of this year. At that time there were 189 creditors, and their total debts amounted to about £8,570. Under the scheme these debts were to be paid in full by instalments spread over eight months and interest was provided for. His Lordship gave his approval to the scheme.

Meetings of Creditors

Moulding Developments, Ltd.—A meeting of creditors will be held at 204-206, Great Portland Street, W.1, on September 9th.

George Jennings, Ltd.—A meeting of creditors was held yesterday (September 1st) at 65, Lambeth Palace Road, S.E.1.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—CHEAPER ELECTRICITY.—The Electricity Committee has decided to reduce the price of electricity in cases where over 750 kWh per quarter is consumed, from ¾d. to ½d. per kWh.

YEAR'S WORKING.—Mr. J. A. Bell, in his annual report, says that during the past two years power consumption has fallen by 6¼ per cent., although charges have been lowered by 7½ per cent. Domestic sales, however, show an increase of 35¼ per cent.

Barrow-in-Furness.—LIGHTING OF WALNEY BRIDGE.—The Highways Committee has approved proposals of the borough electrical engineer for improvements in the lighting of the Walney Bridge.

Bridlington.—ELECTRICITY WORKS TO CLOSE DOWN.—The electricity works are to be closed and offered for sale owing to the change-over to the grid system.

Burnley.—NEW PREPAYMENT METERS.—The Electricity Committee has authorised the installation of prepayment meters enabling consumers to pay through the meter not only for electricity used, but also for their instalments on hire-purchase apparatus.

Burwash (Sussex).—PROSPECT OF A SUPPLY.—The Weald Electricity Supply Co., Ltd., has informed the Parish Council that the question of supplying electricity to the parish is under consideration.

Cheadle and Gatley.—STREET LIGHTING IMPROVEMENTS.—The Urban District Council has decided to apply for sanction to borrow £2,100 for a scheme of improved street lighting prepared by the electrical engineer and manager, Mr. R. W. Willis.

SUPPLY TO BROOKHEAD ESTATE.—Sanction has been received to a loan of £10,000 for plant, machinery, mains and services for supplying the Brookhead Estate, where it is proposed to erect over 500 houses.

RAILWAY STATION LIGHTING.—The L.M.S. Railway Co. has decided to install electric lighting at the Heald Green Station. The installation of electric lighting at other railway stations in this area, principally at Cheadle Hulme and Gatley, is also contemplated.

Cheshire.—SUPPLY TO MENTAL INSTITUTION.—The County Council proposes to take a supply of electricity for the Mental Institution from the North Wales Power Co., at an estimated cost of £750.

Cockermouth.—ELECTRICITY SCHEME DELAYED.—The Rural District Council has been informed by the Central Electricity Board that negotiations on the agreement in connection with the supply to the Mid-Cumberland Electricity Supply Co. had been protracted, but that the outstanding points appeared to have been settled, and a draft agreement had been sent to the company for final approval. Everything possible would be done to accelerate the completion of the work, but it was doubtful whether this could be accomplished before December.

Continental.—SWITZERLAND.—The Dixence hydro-electric installation, now in course of construction in the Valais Canton, is intended to work under a head of 5,740 ft., claimed to be the greatest head in the world. Three 50,000-h.p. turbines are being built for the new station by the Société des Ateliers de Charmilles, Geneva.

ITALY.—According to *L'Energia Elettrica*, the capacity of the electric power stations in Italy at the end of June last amounted to 4,455,000 kW, as compared with 4,253,000 kW at the corresponding date last year. Of the total, hydro-electric plants were responsible for 3,682,000 kW and steam and internal-combustion engine stations for 773,000 kW. The output of electricity in Italy during the six months ended June last amounted to 4,768,322,000 kW, as against 4,727,584,000 kW in the similar period of 1931, an increase of 0.86 per cent.

SPAIN.—The *Revista de Ingenieria Industrial* announces that the Spanish Government has commissioned Don Enrique G. Gravalos to visit England and Italy with the object of studying the progress and development made in rural electrification.

Egypt.—ASSOUAN SCHEME MODIFIED.—According to the *Financial Times*, the Egyptian Government has decided to divide the Assouan Dam power scheme into two parts. Instead of embarking upon the hydro-electric and fertiliser manufacturing scheme, which was estimated to cost £4,000,000 and

Municipal Supply Undertakings' Results in 1931-32

Town.	Engineer's Name.	Income. 1930–31.	Income. 1931–32.	Working Expenditure. 1930–31.	Working Expenditure. 1931–32.	Profit or Loss. 1930–31.	Profit or Loss. 1931–32.	Sales of Electricity. 1930–31.	Sales of Electricity. 1931–32.
		£	£	£	£	£	£	kWh.	kWh.
Aberdeen	J. A. Bell	255,904	223,372	104,117	102,994	+ 9,323	+ 4,317	—	—
Glasgow	H. Bell	1,306,574	1,277,130	620,557	626,887	+ 27,121	+ 45,813	237,770,666	236,815,327
Nelson	T. Dawson Martin ...	66,938	69,930	38,792	40,507	+ 4,491	+ 1,605	10,878,998	12,379,897
North Berwick	E. T. Pound	5,059	5,273	—	2,424	+ 47	+ 91	191,349	248,777
Oldham	F. L. Ogden	247,324	271,669	137,372	143,150	+ 1,559	+ 10,978	46,518,330	51,771,658
Perth	J. Lambert	40,900	33,798	—	25,291	+ 5,362	+ 880	—	—
Sydney (Aus.)	H. R. Forbes Mackay ...	2,480,745	2,319,579	1,056,256	1,058,700	+ 24,697	— 178,950	332,949,774	319,326,234
Wallasey...	B. T. Hawkins	183,904	179,138	102,015	97,388	+ 34,783	+ 24,476	56,190,564	56,173,689
Watford	A. W. Barham	164,630	158,975	82,871	89,154	+ 33,365	+ 20,661	30,456,030	34,917,061
West Midlands J. E. A.	E. F. Hetherington ...	420,972	409,717	210,692	244,947	+ 11,474	+ 4,795	201,645,649	209,158,634

for which tenders were called for August 15th, the contracts now offered relate to the hydro-electric scheme only. Tenders are open until September 15th for this project, which is estimated to cost £2,000,000.

Hailsham.—STREET LIGHTING INQUIRY.—A Ministry of Health inquiry was held on August 23rd into the application of the Rural District Council for sanction to a loan of £1,630 for converting the street lighting from gas to electricity. The clerk stated that the average cost of lighting by gas for ten seasons was £266 per season, as compared with a tender of £113 by the Eastbourne Corporation for electric lighting by means of 136 lamps for the whole year.

Irish Free State.—EXTENSION OF SHANNON SCHEME.—It is understood that the Government proposes to introduce a Bill in the autumn session of the Dail to do away with the navigation of the river above Athlone, lowering the level of Lough Rea and opening the sluice gates at Tarmon and to the north of that lough, or giving effect to the Lough Allen scheme, the total cost of which would be about £300,000.

Isle of Axholme.—SPECIAL ORDER.—The Yorkshire Electric Power Co. has informed the Rural District Council that it has obtained a Special Order for the area including the Isle of Axholme, and arrangements are proceeding for the formation of a separate company. Mains will be laid in Epworth and Crowle as soon as the necessary wayleaves are obtained.

Llandilo.—SUPPLY EXTENSIONS.—The Rural District Council has sanction the application by the Brynamman and District Electric Supply Co. for the extension of its supply area.

Northern Ireland.—WARRENPOINT (CO. DOWN).—It has been decided to substitute electricity in place of gas for public lighting.

BELFAST.—A strike of electricity and tramway employés is threatened as a result of a dispute regarding a proposed reduction in wages.

Reading.—OVERHEAD LINE INQUIRY.—A Ministry of Transport inquiry was held on August 16th into an application by the Central Electricity Board for sanction to the erection of overhead cables from the sub-station at Reading through South Oxfordshire, across the Thames at Mapledurham, and thence to Pangbourne. There was opposition on the ground that the line would pass through some of the most beautiful country in South Oxfordshire, that it would spoil beauty spots, and that the "pylons" might affect the rateable value of important residential property. The estimated cost of the route proposed was stated to be £19,900, and the cost of the alternative routes suggested was £27,500 and £34,500, the latter including three miles of underground cable. With regard to a suggestion that cables should be laid under the Thames it was stated that this would mean an additional £2,500 for each crossing. The original estimate for overhead lines was £1,600 per mile, and for underground cables £9,000 per mile. For the Central Electricity Board it was contended that the effects of the proposed line had been exaggerated.

Rothesay (Bute).—ANNUAL ILLUMINATIONS.—Thousands of people witnessed the annual illumination of the town last Friday, when the promenade was lit up by multi-coloured lights and floodlighting effects.

Saffron Walden.—FUTURE SUPPLY ARRANGEMENTS.—At the August meeting of the Town Council a member asked when the County of London Electric Supply Co., Ltd., was going to take over the electricity supply in the borough. The Mayor replied that the matter had been considerably delayed, and the present position was that the Corporation would carry on through the winter. There was no likelihood of getting a bulk supply at present.

Stoke-on-Trent.—REPAIR WORK AT PUBLIC BUILDINGS.—The Estates Committee has asked for a list to be prepared of electric lighting contractors in the various districts of the city to carry out repair work, &c., at the public buildings.

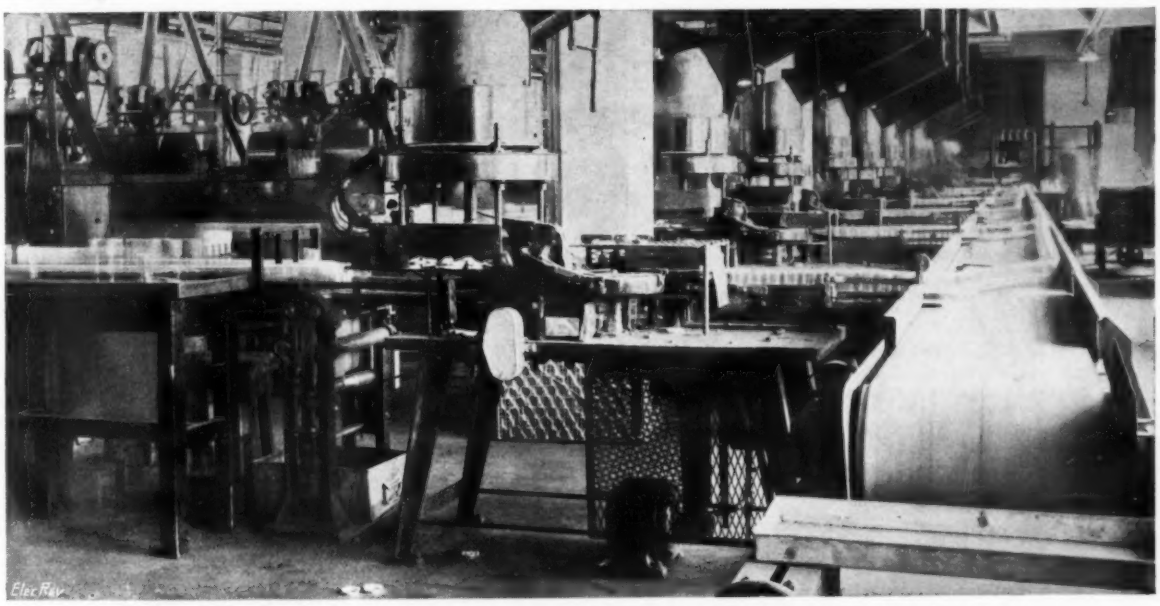
SUPPLY TO HOUSING ESTATE.—The Electricity Committee has received an application for a supply to be given to 47 houses now being erected in Hassam Parade, Wolstanton, but has deferred consideration pending further negotiations with the borough electrical engineer of Newcastle.

Stornoway.—A SUPPLY AVAILABLE.—The Elgin Electric Supply Co., Ltd., has made such good progress with the town's electrification scheme that the supply became available to consumers last Saturday.

Sunderland.—OVERHEAD LINES OBJECTIONS.—The County of Durham Electrical Power Distribution Co., Ltd., proposes to erect l.p. overhead lines at Hylton. There are several objectors to the scheme and a Ministry of Transport inquiry is to be held.

Torquay.—E.H.P. MAINS EXTENSIONS.—To meet the growing demands for electrical energy in Torquay and Paignton and in the area south of Totnes, a new e.h.p. main is being laid from the Torquay Corporation's generating station at Newton Abbot to the main sub-distributing station in Upton Valley, Torquay.

Tredegar.—SUPPLY SCHEME.—The Urban District Council has appointed a sub-committee to investigate and report on a scheme for supplying electricity in the district. It is proposed to appoint a consulting engineer, and to confer with individuals, local authorities or companies regarding the proposed supply. This decision was made after considering a letter from the managing director of the South Wales Electrical Power Distribution Co.



Cocoa weighing machines (right) and lidding machines at the Bournville works. (See page 318.)

United States.—FREE ELECTRICITY FOR REFRIGERATOR PURCHASERS.—During a recent refrigerator sales campaign Kansas City Power and Light Co. supplied purchasers with 100 kWh of electricity free of charge, the cost being borne equally by fifteen co-operating refrigerator distributors and their dealers.

GENERATION OF ELECTRICITY.—According to the *Electrical World*, electrical energy produced during June was 13 per cent. less this year than last. Figures recently released by the U.S. Geological Survey give the total for all public utility plants as 6,536,893,000 kWh, against 6,630,367,000 kWh in May and 6,778,652,000 kWh in April. The Survey's report includes electric railway plants and others contributing to the public supply of energy as well as central stations for light and power. The average daily output was about 2 per cent greater in June than in May, the change being very slightly better than the normal. The output from water power continues relatively larger than in corresponding months of 1931, the percentage compared with total output being 41 in June, 1932, as against 38 in June, 1931. Regionally the greatest decrease in total production occurred in the Mountain Division, apparently as a result of conditions in the metal mining industry.

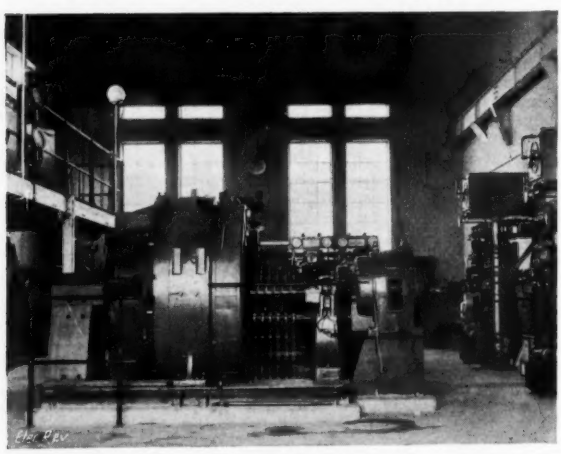
West Midlands.—BULK SUPPLY.—An increase last year in bulk supplies of electricity amounting to 7,512,985 kWh is reported in the annual report of the West Midlands Joint Electricity Authority, whose total sale during that period amounted to 209,158,634 kWh. The total costs were £403,526, representing 0.410d. per kWh generated, and 0.463d. per kWh sold, as against £408,407, and 0.429d. and 0.486d. respectively in the previous year.

Traction

Continental.—DENMARK.—To assist them in controlling traffic policemen on point duty in Denmark are wearing as an experiment gloves fitted with electric signal lamps.

L.M.S. Railway.—THE NEW BARKING ELECTRIC SERVICE.—With the opening, on September 12th, of the electric service over the new widened lines between Barking and Upminster on the London, Tilbury, and Southend section of the L.M.S. Railway, the suburban zone of London will be extended by nearly eight miles. Work has been in progress for about two years, and the widening has necessitated the removal of 400,000 cu. yards of material and the reconstruction of a number of bridges. Two new stations have been built—Upney, between Barking and Becontree, and Heathway, between Becontree and Dagenham—and Becontree, once a small halt, is now an up-to-date, four-platform station. The scheme is an important stage in an extensive programme, the cost of which is estimated at £750,000, for improving the traffic facilities generally on the London-Southend line. We reproduce herewith a photograph of the Upminster sub-station.

London.—UNDERGROUND WAGE CUTS.—No decision was reached at a mass meeting of the Electrical Trades Union held on Tuesday at the Labour Hall, Hammersmith, with regard to the attitude to be adopted towards the proposals of the



The Upminster sub-station on the Barking-Upminster electrified section

Underground combine for a percentage reduction in wages for all employés on the London Underground railways. The next step will rest with the London District Committee of the Union, and finally with the National Executive. The Electrical Trades Union is the only one of the craft unions which has not reached an agreement.

Morocco.—ELECTRIFICATION PROPOSAL.—Included in a programme of public works to be carried out during the next six years is a proposal to spend 250,000,000 francs on the electrification and extension of the railways. An important scheme for the improvement of electricity supply facilities is also proposed.

Newcastle-upon-Tyne.—RELAYING TRACK.—The City Council is proceeding with the relaying of the tram track in Osborne Road, the lines used being those removed from the Denton route.

South Africa.—TROLLEY-BUS EXPERIMENT AT CAPE TOWN.—The Cape Town Tramway Company has applied to the City Council for permission to alter the overhead lines in certain streets in order that a trolley-bus route may be operated as an experiment for a year. The Guy trolley-bus which has recently been touring in South Africa will be used, and the company hopes that the result will be a change-over to trolley-buses on the various Gardens routes.

DURBAN.—The Corporation Electricity Committee is to investigate the possibility of handing over the tramways to private enterprise, subject to safeguards regarding rates and routes. If this suggestion is finally agreed to, the Council will invite tenders with a statement of the terms on which the undertaking would be taken over. For several years the tramways have incurred heavy losses, despite drastic economies.

Sunderland.—TRAMWAY SPEED-UP.—The tramway manager, Mr. C. A. Hopkins, has prepared a revised time-table in order to speed up the tram service.

United States.—NEW YORK UNDERGROUND IN RECEIVER'S HANDS.—The Interborough Rapid Transit Co., which operates the major portion of the New York underground and elevated lines, has been handed over to a receiver on the petition of a creditor. The company was unable to meet $31,000,000 of notes maturing on September 1st and the present position is due largely to municipal politics which have caused the company to charge a flat rate of five cents, enabling passengers to travel a distance of 28 miles. A new municipally controlled underground line, called the Independent Subway, which is to be opened in a few days' time, will help to relieve the acute congestion on the Interborough lines.

Communications

Australia.—NEW TYPE TELEPHONE.—The Postmaster-General has now allowed telephone subscribers to install the latest type of telephone, combining mouthpiece and earpiece in one section, provided they pay the additional cost.

SUGGESTONS FOR BROADCASTING.—In a paper read to the Institution of Radio Engineers at Sydney, Captain P. P. Eckersley said that 90 per cent. of the rural population of Australia could be adequately served with broadcasting by the employment of wavelengths lying between 1,000 and 2,000 metres. It could be done for an expenditure of £65,000 a year for technical equipment and its maintenance. Eight new stations would have to be erected, but, as existing receiving sets could not pick up long waves, the present medium-wave stations should be continued.

WIRELESS LICENCES.—At the end of June last there were 369,936 receiving licences in the Commonwealth, an increase of 37,967 compared with June 30th, 1931. There were increases in all the States, the totals being: New South Wales, 141,745; Victoria, 139,592; Queensland, 29,060; South Australia, 37,227; West Australia, 12,745; and Tasmania, 9,567.

Channel Islands.—JERSEY CABLE FAULT.—Telephone communication between Jersey and England was interrupted for several days this week owing to a fault in the submarine cable between Dartmouth and the island. Fog interfered with the c.s. *Monarch's* repair work.

Germany.—NEW RADIO AERIAL.—The new Breslau transmitter in Rothsürben, which is about to begin its transmissions, has been equipped with a new type of aerial, the shape of which differs considerably from that of the usual aerial. According to *World-Radio*, it creates greater field intensities, and the nearest zone of fading occurs at a greater distance than before, which means that a larger area is served by the surface wave and is therefore free from fading.

Great Britain.—G.P.O. USES BRITISH VEHICLES.—Morris-Commercial Cars, Ltd., inform us that a large proportion of the vehicles used by the G.P.O. are wholly British. The company has already supplied 1,600 mail vehicles as well as many 1-ton and 30-cwt. lorries fitted up as travelling workshops with all the necessary equipment for the repair and extension of the telegraph system.

MARINE DIRECTION-FINDERS.—The Admiralty announces that the direction-finding stations previously worked by the department are now controlled by the Postmaster-General. In these circumstances, the returns reporting the results obtained are no longer required by the Admiralty.

Rhodesia.—TELEPHONE EXTENSION.—The telephone service has been extended to Kafue, and there is a full service from Livingstone, the capital of Northern Rhodesia. Extensions are also being made to other centres along the railway to the copper fields.

South Africa.—RADIO TELEPHONE SERVICE EXTENDED.—The Postmaster-General announces that the radio telephone service to South Africa, which was recently extended to Pretoria and Johannesburg, has now been further extended to Kimberley and Bloemfontein.

AUTOMATIC TELEPHONY.—Four technical experts have arrived on behalf of Messrs. Siemens Bros. & Co., Ltd., Woolwich, to begin the work of installing automatic telephones throughout the Cape Peninsula. About 20,000 of the "Neophone" type instruments are to be installed in Cape Town and district and the complete change-over is to be made before the end of the year.

Turkey.—PRESENT STATE OF COMMUNICATION SERVICES.—A report issued by the Department of Overseas Trade on economic conditions in Turkey states that wireless telephony is non-existent in that country. Ordinary telephone services are, however, in operation between official administrations in all towns. Public services are available in Ankara, Istanbul, and Izmir, and also between Istanbul-Yalova, Yalova-Eskisehir, and Edirne-Istanbul. Communication has been established between Istanbul and Sofia, Budapest, Bucharest, and Salonica, while tests have been made with London, Paris, and Geneva. Cable telegraph services are administered by the State, except those of the State railways and concessionary companies and the Eastern Telegraph Co.'s submarine services between Istanbul and Odessa, Syra, Izmir, Tenedos, Chios, and Lemnos. Commercial radio-telegraph stations administered by the State operate at Ankara and Istanbul, at both of which towns there are also broadcasting (entertainment) stations.

U.S.A.—BROADCASTING.—There are 607 licensed radio broadcasting stations in use, so situated that in 46 per cent. of the country there is good reception at night and 56.2 per cent. in the daytime. On a population basis good reception is possible to 89.6 per cent. at night, and to 94 per cent. in daylight. The investments in the industry totalled $48,000,000 in 1931, in which year the receipts were nearly $78,000,000 gross. Of the programme time, 33.8 per cent. of the National Co.'s and 21.94 per cent. of Columbia's was "sponsored." Of the total time, 6.55 per cent. was devoted to sales advertising and 18.11 per cent. to commercial programmes.

NEW STATIONS.—Several new transmitters are being built with greater power; the trend is towards the maximum of 50 kW allowed by the Federal Radio Commission and tests are being made with even greater power. New stations are being built at Washington, Philadelphia, New York, Minneapolis-St. Paul, and Nashville (Tennessee).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—September 2nd. County Council. Various work (including electrical) at the Culter housing scheme. Messrs. Tawse & Allan, architects, 10, Bon Accord Square, Aberdeen.

Aldershot.—September 6th. Town Council. Lighting installation at East End Schools. (August 19th.)

Angus.—September 14th. County Council. Electrical work for Birkhill housing scheme. County clerk, County Buildings, Forfar (deposit £1 1s.).

Australia.—MELBOURNE.—October 25th. Post and Telegraph Department. Telephone receivers and parts (A.X. 11452)* and telephone transmitters, &c. (A.X. 11453.)*
October 10th. City Council. Metal-clad switchgear, &c. (A. 11467.)*

Belgium.—BRUSSELS.—September 26th. Power station for the Hôpital, St. Pierre (estimated cost 1,000,000 francs). M. le President, le Commission d'Assistance Publique de la Ville de Brussels, 46, Boulevard du Jardin Botanique, Bruxelles (A. 11468.)*
LIEGE.—September 10th. Liége University. Turbo-alternator set, with accessories. (G.X. 11785.)*

Birmingham.—September 7th. Public Works Committee. Installation of electric lighting and power supply (re-wiring in conduit) at Handsworth Council House, Public Works Section. Mr. H. H. Humphries, city engineer and surveyor, Council House (deposit £3).

Bonnyrigg and Lasswade.—September 7th. Town Council. Electrical work for housing schemes. Town clerk.

East Lothian.—September 12th. County Council. Various works, including electrical installation, at new school, Prestonpans. Messrs. R. and A. K. Smith, 4, Forres Street, Edinburgh.

Edinburgh.—September 3rd. Corporation. Electric goods lift at new public washhouse at Union Street. City architect.

Egypt.—ALEXANDRIA.—October 1st. Director-General of Ports and Lighthouses. Electric lighting of the Port of Alexandria. (A. 11462.)*
October 1st. Office of H.M. Yachts. Generating set and electrically driven pumps for the Royal Yacht *Mahronssa*. (G.X. 11778.)*
CAIRO.—October 17th. Director of Stores, Department of Public Health. X-ray apparatus and accessories. (A. 11458.)*

Fife.—September 19th. Miners' Welfare Fund Committee. Heating and electric lighting at Miners' Welfare Institute at Bowhill, Cardenden. Messrs. Muirhead & Rutherford, architects, Dunfermline.

India.—SIMLA.—October 4th. Indian Stores Department. Four 3-ton level luffing electric quay cranes, portal type. (A.X. 11447.)*
NEW DELHI.—December 5th. Indian Stores Department. A.c. ceiling fans. (A.X. 11461.)*

Irish Free State.—DUNDALK.—September 10th. Electrical installation at Ardee Mental Hospital. Messrs. J. P. Tierney & Co., 44, Kildare Street, Dublin (deposit £5 5s.).

Kirkcudbright.—September 13th. County Council. L.p. overhead and underground distribution lines and services, 11,000-V underground cables, and a kiosk sub-station. (August 26th.)

London.—BATTERSEA.—September 21st. Borough Council. Electric travelling crane and rubber band conveyor. (August 26th.)
METROPOLITAN WATER BOARD.—September 16th. Electrically driven pumps and a 50-kW turbo-generator. Chief engineer, 173, Rosebery Avenue, E.C.1 (deposit £2 2s.).
September 30th. South Indian Railway Co., Ltd. Steel coaches, electrical control and traction equipment. (August 26th.)

New Zealand.—INVERCARGILL.—October 10th. Tramways and Electricity Department. Switchgear. (A. 11454.)*
October 10th. City Tramways and Electricity Department. Single-phase transformers. (A. 11455.)*

Oban.—September 30th. Town Council. Oil engines, alternators, cooling tower, travelling crane, mercury arc rectifier kiosks, &c. (See this issue.)

Oldham.—September 15th. Public Assistance Committee. Lamps and fittings for the Institution, Rochdale Road. Public assistance officer, Rochdale Road.

Portsmouth.—September 19th. Electricity Department. Automatic reversible battery booster and control gear. (August 26th.)

Salford.—September 8th. City Council. Lighting and heating installation at new police station, Regent Road. City electrical engineer, Frederick Road.

South Africa.—JOHANNESBURG.—September 24th. City Council. 6,600-V and 660-V cables (A. 11457)* and metal-clad switchgear units (A. 11456.)*

Stornoway.—September 3rd. Town Council. Wiring for electric lighting at housing scheme. Burgh surveyor, Municipal Buildings, Stornoway.

Sunderland.—September 5th. Corporation. Insulated cable and wire, meters and lamps. (August 12th.)

Warrington.—September 5th. Electricity and Tramways Committee. Cables, conduits, and reinforced concrete cable protector slabs and tiles. (August 19th.)

Warwickshire.—September 10th. County Council.. Electric wiring, mains, distribution switchboard, &c., for proposed male children's villa, Weston Colony for Feeble Minded. Mr. A. B. Mallinson, consulting engineer, 44, Brazennose Street, Manchester.

Whitehaven.—Electric Supply Department. E.h.p. and l.p. switchgear, transformers and accessories. (August 26th.)

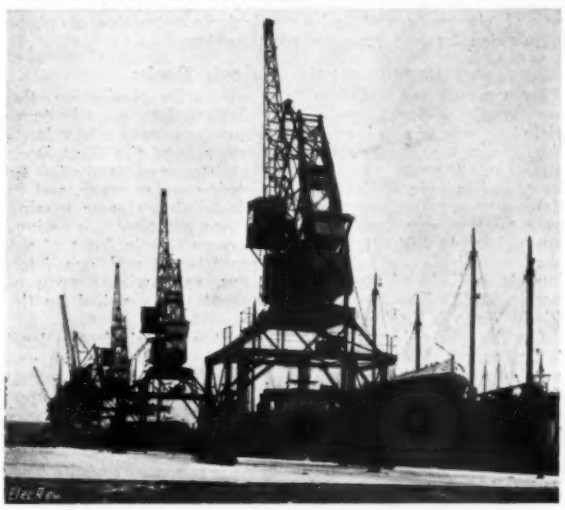
* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Aberdeen.—Electric lighting work for Fish Market extension (£126).—Sparks Electrical Engineering Works.

Hungerford.—Berkshire County Council. Accepted. Electric lighting at Poor Law Institution (£348).—Baughan & Co., Reading.

India.—BOMBAY.—Standing Municipal Committee. Accepted. Six sets of air compressors & English Electric motors and one spare motor (Rs.67,250).—G. M. A. Diesel & Electrical Co. Two sets of transformers, each set consisting of two 6,600-400-V transformers, for new compressor stations (Rs. 10,420).—English Electric Co. Switchgear (English Electric) (Rs. 9,070).—G. M. A. Diesel & Electrical Co.



New equipment at Goole docks. (See page 338.)

Saffron Walden.—Town Council. Accepted. Replacing battery at the electricity works (£420).—D. P. Battery Co.

Stoke-on-Trent.—Libraries Committee. Recommended. Special lighting equipment for library.—Benjamin Electric, Ltd.

Forthcoming Events

Institution of Mechanical Engineers.—August 19th-September 13th. Canadian summer meeting.

British Association.—August 31st-September 7th. York. Annual meeting.

Institute of Metals.—September 3rd-October 8th. Visit to U.S.A., and Canada, to include annual autumn meeting.

Association of Public Lighting Engineers.—September 5th-8th. Blackpool. Annual meeting and conference.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following:—

HARVARD cement.
PRIMO hot and cold air diffuser.
ROWENTA toaster.

Telephone Equipment for Fire-damp Mines

A portable telephone set specially designed for use in collieries subject to fire damp has recently been developed in the research laboratory of the French Central Colliery Committee at Montlucon, Allier Department, and has been approved by the French Department of Mines.

Notes

Carnival Illuminations at Southend

September is the month of seaside illuminations and Southend-on-Sea does not mean to let the grass grow under its feet in taking full advantage of the latest means electricity offers for making it look attractive by night. The town has for some time past had a large number of illuminations in the form of strip lighting at the Pier Gardens, the Bandstand and elsewhere, but Mr. A. C. Johnson, the borough electrical engineer, and the members of his staff have, during the past few weeks, been working at full pressure providing additional lighting effects of the most up-to-date character.

Floodlighting in various colours has been introduced at the Westcliff Rock Gardens with outstanding success, a new type of G.E.C. indirectly lighted pillar lamp placed at intervals amid the general scheme introducing an additional pleasing feature. To interest the children various characters from nursery rhymes appear in red, blue and mauve neon tubing at the Shrubbery, Spring Hill, while the beauties of architectural floodlighting are well demonstrated at St. Clement's and St. Mary's Churches.

The new illuminations, which have been arranged principally in connection with the Carnival now being held, were formally switched on last Friday by the Mayoress, Mrs. Tattersall, and it is hoped and expected that they will become an annual feature. Pictures of the illuminations are reproduced on page 329.

The Electricity Department is also responsible for a travelling electrical exhibition which has been taking part in the Carnival festivities. The vehicle demonstrates some of the numerous uses of electricity and looks particularly attractive at night illuminated by low pressure neon lighting.

Improvements at Goole Docks

By arrangement with the Aire and Calder Navigation, the owners of the docks, the L.M.S. Railway has recently completed an extensive scheme comprising the provision of a large shed, sidings, and cranes at the north side of the West Dock at Goole. There are four sidings, each approximately 560 ft. long, at the back of the shed, two being under cover, and in the centre of them there is an electrical traverser passing over all the four lines of rail. There are also two sidings approximately 1,040 ft. long on the quay side in front of the shed, which is equipped with five 30-cwt. and one 5-ton longitudinal electric travelling cranes, each with a span of nearly 71 ft. The foregoing equipment was supplied by the Clyde Crane & Engineering Co., Ltd.

On the quayside there are eight 3-ton portal electric level luffing cranes (Cowans & Sheldon, Ltd.) with minimum and maximum rakes of 20 and 53 ft. respectively. The luffing device is of a simple type which involves only one hoist rope at the jib head. This is particularly advantageous in view of the cranes being arranged for operating grabs when required, the bell ropes of which also pass over the jib head and have to be arranged so that the bell follows the movement of the load. This discharge can be adjusted from the driver's cabin. Another feature of these cranes is that unrestricted view of the ship's hold can be had from the driver's cabin. The level luffing movement is actuated by crank. These cranes can deal with three tons at a speed of 180 ft. per minute and, being operated by d.c. motors, lighter loads can be lifted correspondingly faster. The slewing speed is 400 ft. per minute at the jib head and the luffing speed 150 ft. per minute. On the quay and sidings there are fifteen electric capstans to facilitate the movement of wagons.

The "Queen of Bermuda"

On Thursday last week Messrs. Vickers-Armstrong, Ltd., Barrow-in-Furness, launched the 22,000-ton turbo-electric ship *Queen of Bermuda*, built for the Furness Withy line to replace the *Bermuda*, which was destroyed by fire in Belfast Harbour last year. The *Queen of Bermuda* is an improvement on the *Monarch of Bermuda*, launched from the Walker-on-Tyne yard last year, the new vessel being 576½ ft. long and 76½ ft. broad, while the depth to "C" deck is 43¼ ft. Her speed will be 19¾ knots and accommodation is provided for 731 passengers. The General Electric Co., Ltd., has supplied the main propulsion units comprising two 7,500-kW turbo-alternators; four 4,750-h.p. propulsion motors; four 750-kW geared d.c. turbo-generators for auxiliary purposes; and one 45-kW emergency generator. To propel the vessel through the water at its maximum speed a power of 19,000 h.p. is required. The vessel is primarily intended for Messrs. Furness, Withy and Co.'s New York-Bermuda service.

The Confectionery Exhibition

The Chocolate and Confectionery Exhibition opened at Olympia on Wednesday and will remain open until Thursday next. Except for Messrs. J. C. King, Ltd., who are showing several models of the "Piccadilly" sign, we noticed no specifically electrical exhibit. Several stands displayed machinery driven by electric motors; the devices are neat but conventional. The lighting of the stands varies from adequate to very good.

The two bays occupied by Messrs. Clarke, Nickolls and Coombes, Ltd., cover half an acre, and are worth a visit by those interested in the results of collaboration between the electrical engineer and the display men. Except for two display fittings, tubular brackets at the entry, and an illuminated fountain, the whole of the lighting is concealed. Some 350 Crompton-Parkinson 100-W lamps are in use fitted in B.T.-H. angle reflectors or on plain battens, and 2,500 yards of 3/22 cable was required for connecting up. Six fans have also been installed. Two 100-A services have been run by the exhibition authorities and the m.d. is about 150 A at 220 V. It is estimated that the cost of electricity for the run of the exhibition will amount to £76 at 6d. per kWh. This figure is much higher than would be the case if direct illumination was used, but the saving in capital expenditure, as well as its greater efficacy, justify the methods adopted.

A view of a section of this stand appears on p. 316. Mr. J. Edwards, electrical engineer to the company, was responsible for the design and installation of the illumination scheme.

The Building Centre

Arrangements have been made to open the Building Centre, 158, New Bond Street, London, W., on Wednesday next, September 7th. The electrical equipment of the building is in accordance with the most up-to-date practice, and there will be many features of interest to our industry. The Centre was the subject of our last week's leading article.

Ultra-Violet

A reader has sent us an extraordinary document which he has received from a foreign firm in which the merits and multitudinous applications of a certain ultra-violet-ray apparatus are set forth, under the title of "Some Camps for Using the ———." (The word "Camps" appears several times in the document, but its meaning is unascertainable.) We wish that we could afford the space for the whole of it, but it would need more than a column. There are, however, passages which cry out for quotation, for instance:—

"At the silk culture a study of the fluorescence gives a way of learning the physiological state inside the worn, and the breeder has in such a way the possibility of eleminating ill worms obtaining thus a better produce."

"The freshness of the fish is also easily to be ascertained. A fish which one day after hawing been slaughtered had been lying in the cellar, shows at the examination an intensive dark-violet shining on the whole surface, without showing by any bad smell its putrefaction. At a prolonged lying appear a green and also red fluorescence."

"Of a special importance is the use of the ——— at the examination of the stableness of the scoria of high-furnaces, which scoria is used for the road-making. By means of the ultra-Violet rays you can distinguish the stable qualities of the unstable ones."

Finally, there is a happy misprint:—

"You can also find out the mixtures of bean-flour with wheaten flour. More the flour is fine, more flourescence it shows."

The First Edison Plant

On September 4th, 1882, the Pearl Street Station in New York was put into commercial operation by the Edison Electric Illuminating Co. (now the New York Edison Co.). The plant consisted of six 125 (nominal) h.p. 350-r.p.m. Porter-Allen engines, each directly connected to an Edison "Jumbo" dynamo with a capacity of 1,200 16-c.p. 110-V lamps. Steam at 120 lb. per sq. in. was supplied by four Babcock & Wilcox boilers.

The district served was about one sq. mile in Lower Manhattan by means of 15 miles of underground cables. There were fifty-nine consumers, all for lighting. Fan motors came into use in New York in 1884. Motors were first used in industry for driving printing presses and flatirons were the first domestic appliance. The capitalisation of the Pearl Street undertaking was one million dollars in 1882. That of the present combine of four companies is 735 million dollars. Appropriate arrangements are being made by the New York Edison Co. to celebrate the jubilee on September 4th and 12th.

Appointments Vacant

Overhead line foreman for Traction Branch of the Great Indian Peninsula Railway.

Probationary inspectors for the Engineering Department of the Post Office.

Lecturer on electrical engineering at the Leicester College of Technology.

Lady demonstrator for Barrow-in-Furness Electricity Department.

(See our advertisement pages to-day.)

"Magicoal Plus"

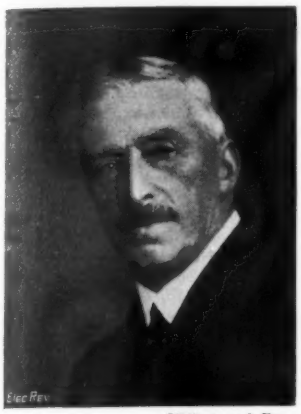
"Magicoal Plus" is the name given by Messrs. Berry's Electric, Ltd., 85 and 86, Newman Street, W.1, to their new design of fires. The name is well chosen, as the popular features of the "Magicoal" are retained with a notable improvement. We always regarded the "Magicoal" as a good imitation of a coal fire; in the new type, which we saw at "Touchbutton House" earlier in the week, it is even more difficult to draw the dividing line between illusion and reality. Moreover, the quality of "coal" is improved, artificial silkstone taking the place of the relatively small lumps previously used.

The "coal" is now made of hollow metal instead of moulded slabs of crude glass. An incidental advantage is the very noticeable reduction in weight, which will make the smaller models more easily portable and presumably more robust. The new type has not yet been released for the market, but models may be seen at "Touchbutton House"

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. Fred J. Down has been advised by his doctor to "take things easy," and is therefore giving up some of his work. Mr. Down was a partner in the firm of Laing, Wharton & Down when, in 1884, they secured the agency for the American Thomson-Houston Co. In this capacity they exhibited plant at the International Inventions Exhibition of 1885, and were awarded a gold medal for arc lighting equipment. Subsequently the British Thomson-Houston Co. was formed. The firm also held agencies for Brill trucks, the Buda Company's products, and other important plant. In later years Mr. Down acted as expert to fire assessors in connection with fires at electrical and engineering works, and he has also been called in frequently to advise on the suppression of noise and vibration. Overhead line work has also been one of his specialities. Mr. Down is a member of the Institution of Electrical Engineers, an associate member of the Institution of Civil Engineers and a fellow of the Chemical Society.



[Elliott and Fry

Mr. F. J. Down

Sir William Bragg, who visited Buenos Aires during the month of July, delivered a series of lectures to the Centre of British Engineering and Transport Institutions in the Argentine Republic, the Facultad y La Academia de Medicina, the Argentine Association of British Culture, and to various scientific bodies on the importance of research in industry, the application of X-Rays in the determination of the structure of crystals, the life and work of Michael Faraday, and other scientific subjects, the lectures being well attended and very much appreciated. The distinguished scientist also delivered a most impressive speech to the members of the British Chamber of Commerce of Buenos Aires on the occasion of a luncheon given in his honour during his stay in the city. Sir William later sailed for Rio de Janeiro, where he was to deliver two lectures before returning to England.

Mr. R. K. Jopson, M.B.E., the Commercial Secretary to H.M. Embassy at Buenos Aires, is in this country on an official visit. He will be available at the offices of the Department of Overseas Trade during the period September 19th—24th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Argentina. At a later date Mr. Jopson will visit a number of industrial centres in the provinces. Firms desiring interviews with Mr. Jopson should apply to the Comptroller-General of the Department, 35, Old Queen Street, London, S.W.1 (Reference 3733/1/32).

Mr. Donald Windley, who is in business as an electrical engineer at Chelmsford, was married on August 15th to Miss Winifred M. Levis.

We reproduce below two snapshots taken upon the occasion of the Batti-Wallahs' summer outing on August 25th, when "Admiral" Walter Riggs, who is seen in the right hand picture, took command of the t.s.s. *Engadine* for a cruise to the Thames Estuary. During the trip deck sports and dancing were organised, there was a plentiful supply of refreshments, and the weather was excellent—factors which all contributed to a happy day.

Mr. H. G. McHaffie.—The marriage took place at Rugby on August 18th of Mr. Hugh Gordon McHaffie, an electrical engineer of the British Thomson-Houston Co., formerly with the firm at Rugby, and Miss Elsa Samuelson.

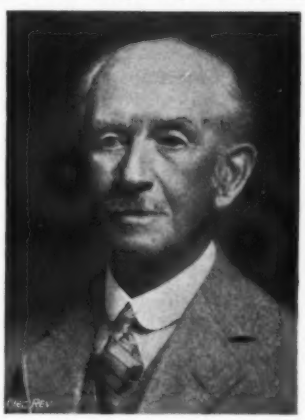
Mr. J. J. M'Gann, postmaster of Ennis, has been appointed Controller of Telegraphs in the Irish Free State in succession to Mr. J. J. Kenny, who has retired.

Mr. F. Husband, A.M.I.E.E., informs us that he has now completely recovered from his long illness and is out of hospital. His address is "Elmhurst," 35, Carlisle Avenue, St. Albans, Herts.

Mr. E. Poole, whose retirement from the position of assistant borough electrical engineer at Durban has already been announced, is now in England and for the present communications should be addressed to him care of Barclay's Bank, 111, St. Martin's Lane, W.C.2.

Obituary

Mr. W. A. Coulson.—Mr. William Arthur Coulson, one of the founders of Messrs. Mavor & Coulson, Ltd., who took an important part in the pioneering of machine mining, died on August 22nd at his home in Kilmacolm, near Glasgow. When a young man, Mr. Coulson studied electricity, but his work with Mavor & Coulson, Ltd., was on the financial and commercial side. By his courageous persistence in the face of difficulty, he took part in the establishment and growth of a firm that has become known throughout the world. He was also a director of Messrs. Creed & Co., of Croydon, with whom he had been associated for many years. Mr. Coulson's extreme kindness, considerateness for others, and invariable courtesy won for him the deep affection of a wide circle of friends, not only in Glasgow but throughout the country. His unassuming and retiring disposition, however, kept his name from figuring prominently in a public capacity. The regard in which he was held by the employés of Mavor & Coulson, Ltd., was manifested last year, when, on the occasion of the firm's jubilee, he received a handsome presentation. He is survived by his wife and two sons, one of whom is with Mavor & Coulson, Ltd.



[Annan

The late Mr. W. A. Coulson

Mr. Henry Walter Jenvey, who recently died in Melbourne, at the age of 81, was formerly chief electrical engineer of the Victorian Postal Department. He carried out many improvements in telegraph instruments, including a device to improve duplex and quadruplex transmission on interstate lines. He also invented an apparatus for detecting and finding breaks in cables. Later he was a pioneer of radio in Victoria, and as early as 1901 established wireless communication between Point Ormond and the ship on which the present King, when Duke of York, visited Melbourne, the range being about 15 miles. Mr. Jenvey, who retired in 1910, after 40 years' service, compiled a comprehensive text-book on telegraphy which is still a standard work in the service.

Mr. J. H. Fooks Bale.—The death is announced, at the age of 63 years, of Mr. J. H. Fooks Bale, founder and head of

The Batti-Wallahs' Outing: Left, Messrs. G. C. Burnard (London Electric Wire Co. and Smiths, Ltd.) and L. M. Waterhouse. Right, Mr. J. S. A. Bunting (Henley's), Misses O'Brien, Mr. Walter Riggs (Girdlestone & Co.), and Miss Bennett

the firm of Messrs. Bale, Sons & Co., engineers, Bath Road, Bridgwater. He was for some years manager of the Walthamstow power station, and he carried out a number of important schemes, including the installation of electric lighting plant at Lynton and Lynmouth.

Mr. W. A. Munro.—We regret to record the death in a motoring accident on Monday of Mr. William A. Munro, assistant city engineer of Aberdeen.

Herr A. Cassirer.—The death is reported from Berlin, at the age of 57 years, of Herr Alfred Cassirer, general director of the Dr. Cassirer Kabel und Gummiwerke Gesellschaft, and a leading German authority on electric cable and wire manufacture.

Signor Alberto Lodolo.—The death is reported from Genoa of Signor Ing. Alberto Lodolo, who, in addition to being an electrical engineer, was a leading Italian industrialist and financier and was responsible for the initiation of many of the large electricity undertakings in the country.

Mr. R. B. Wood.—We learn with regret of the death on August 21st, while bathing, of Mr. R. B. Wood, aged 25. From an apprenticeship at the L.N.E.R. shops in Doncaster, Mr. Wood secured an appointment with Standard Telephones & Cables, Ltd., which he left in 1929 to join the British Electric Transformer Co., Ltd., where he was employed in the Estimating Department.

Mr. H. Bacchus.—The death occurred on August 19th, at the age of 76 years, of Mr. Henry Bacchus, head of the firm of Messrs. H. Bacchus, Ltd., electrical engineers, High Street, Bedford.

The following should have been included in the list published last week of floral tributes received for the funeral of the late Mr. J. H. Collings:—From Mr. and Mrs. Bertie Jones, and from Mr. F. Crush and the staff of the G.E.C., Ipswich branch.

Wills.—Mr. Henry Huggins, chairman of Simplex Conduits, Ltd., and other companies, left estate valued at £241,337 (net personalty £236,860).

Mr. Percy C. Ainsworth, a director of Gray Brothers, Ltd., and Magneto & Battery Services, Ltd., Newcastle, left £12,891 (net personalty £6,982).

Mr. Stewart Lack, of Christchurch, Hants, who was at one time with the Eastern Extension, Australasia and China Telegraph Co., Ltd., left estate valued at £8,984 (net personalty £3,827).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Borth and Ynyslas Electric Supply Co., Ltd.—Public company. Registered August 24th with a nominal capital of £7,000 in £1 shares. Objects: To acquire the benefit of the Borth & Ynyslas Electricity Special Order, 1932, made in favour of J. Butterworth and H. Goodman, authorising the supply of electricity in certain portions of the parishes of Cyfoeth-y-brenin, Henllys and Cynnull-Mawr, Aberystwyth. The first directors are: S. H. Johnson, Birchfield, Borth, Cardiganshire, and four others. Solicitors: Smith, Davies & Jessop, 27, Eastgate, Aberystwyth.

Underwoods (Purley), Ltd.—Private company. Registered August 25th. Capital £1,000 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, &c. The subscribers are: B. White, The Holt, Restwick, Tunbridge Wells, Kent; and R. F. Williams, 79, Lombard Street, E.C.3. Solicitors: Kimbers Williams & Co., 79, Lombard Street, E.C.3.

Albion Electric Lamp Works, Ltd.—Private company. Registered August 25th. Capital £10,000 in £1 shares. Objects: To carry on the business of designers, manufacturers, factors, fitters, maintainers and repairers of, agents for and dealers in electric and other lamps, electrical and radio apparatus and supplies, &c. The directors are: A. Boogaerdt, Van Hogendorpstraat 4, Utrecht, Holland; W. R. Preston, 3-7, New Street Square, E.C.4; and A. M. Scales, address not stated.

Simplex Electric Co., Ltd.—Private company. Registered August 25th. Capital £100 in £1 shares. Objects: To carry on the business of electrical and general engineers, &c. The subscribers are: G. J. Withington, The Gables, Francis Road, Stechford, Birmingham; and H. C. Chambers, Kerri, Blakesley Road, Yardley, Birmingham. Solicitors: Pinsent & Company, 6, Bennetts Hill, Birmingham.

Combined Battery Services (Glasgow), Ltd.—Private company. Registered August 25th in Edinburgh. Capital £200 in £1 shares. Objects: To carry on the business of dealers in and agents for batteries and other electrical equipment, electrical contractors, &c. The directors are: A. P. Robertson, 10, Mingarry Street, Glasgow; and D. B. Irvine, 684, Alexandra Parade, Glasgow. Secretary: D. B. Irvine. Registered office: 39, Blythswood Street, Glasgow.

Direct Radio, Ltd.—Registered August 24th. Capital £1,000 in £1 shares. Objects: To carry on the business of importers and exporters of and dealers in wireless, electrical and scientific apparatus, &c. The directors are: G. E. C. Downing, 44, Highbury Hill, N.5; and G. P. Overton, 50, Gleneagle Road, Streatham, S.W.16. Secretary: E. R. Smith. Registered office: 159, Borough High Street, S.E.1.

Alfred G. Roberts, Ltd.—Private company. Registered August 29th. Capital, £100 in £1 shares. Objects: To carry on the business of agents for the sale of magnets, radio equipment, &c. The directors are: H. W. Blundell, "Adare," Harrow Road, Sudbury, and F. H. Hudd, 76, Ashburton Road, Addiscombe.

R. H. Spence & Co., Ltd.—Private company. Registered August 29th. Capital, £1,500 in £1 shares. Objects: To acquire the business of an electrical contractor and radio engineer, now carried on by R. H. Spence at Egham, Surrey, and to adopt agreements with D. E. Green and A. J. Shooter. The subscribers are: D. E. Green, Haslemere, Carshalton Road, Sutton, Surrey; and R. H. Spence, 9, Station Road, Egham. Secretary: D. E. Green.

Rulag Battery Co., Ltd.—Private company. Registered August 27th. Capital, £15,750. Objects: To carry on the business of electricians, electrical, mechanical, hydraulic and general engineers, manufacturers of and dealers in electric storage batteries, &c. The subscribers are: W. G. Ford, 15, Westminster Avenue, Thornton Heath, Surrey; and F. Sawyer, 24, Foxley Road, Thornton Heath. Registered office: 91, Farringdon Road, E.C.1.

Electric Service (Brighton), Ltd.—Private company. Registered August 19th. Capital £200. Objects: To carry on the business of wholesale and retail scientific electrical engineers, manufacturers of electrical and mechanical appliances, &c. The directors are: H. G. Parker, 31, Upper Russell Street, Brighton; and Mrs. B. E. Hose, 11a, Palmeira Avenue, Hove. Registered office: 31, Upper Russell Street, Brighton.

Willis & Co. (Meritus), Ltd.—Private company. Registered August 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric transformers, chokes, inductances, condensers, resistances, rectifying units, converters, generators, storage batteries, valves, lamps, &c. The first director is Marjorie Chellew, 13, Brownswood Road, Finsbury Park, N.4.

J. Houghton, Ltd.—Private company. Registered August 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a wholesale and retail dealer in radio goods carried on by J. Houghton at 89, Nineveh Road, Handsworth; 70, Winson Green Road; and 537, Park Road, Hockley, all in Birmingham. The directors are: J. Houghton and Mrs. M. Houghton, 1514, Stratford Road, Hall Green, Birmingham. Registered office: 89, Nineveh Road, Handsworth, Birmingham.

Returns of Electrical Companies

British Columbia Electric Railway Co., Ltd.—Return dated February 10th (filed March 7th, 1932. Capital, £6,320,000 in £1,440,000 5 per cent. cumulative perpetual preference stock, £1,440,000 preferred ordinary stock, £2,406,103 deferred ordinary stock, and 1,033,897 unissued shares of £1 each. All the preference, preferred ordinary, and deferred ordinary stock issued and fully paid up. Indebtedness in respect of mortgages and charges, £2,820,670.

Flinders (Wholesale), Ltd.—Particulars filed of £15,000 debentures authorised August 18th, 1932, and covered by trust deed of same date, charged on plant, chattels and affects in premises in Colchester, Norwich, Ipswich, Cambridge and Portsmouth, and company's undertaking and other property, present and future, including uncalled capital, the amount of the present issue being £5,000. Trustee: A. V. Perry, 32, Bishopsgate, E.C.2.

T. W. Broadbent, Ltd.—Capital £5,000 in 440 preference and 560 ordinary shares of £5 each. Return dated July 31st, 1931 (filed April 9th, 1932). All shares taken up. £35 paid on seven ordinary shares. £4,965 considered as paid on the remainder. Mortgages and charges, nil.

Rochdale Community Radio, Ltd.—Satisfaction to the extent of £1,000 on June 30th, 1932, of debenture dated December 31st, 1931, and registered January 15th, 1932. (According to the register of mortgages, the debenture registered January 15th, 1932, originally secured £1,000.)

Abbey Cables, Ltd.—Capital, £2,000 in 1,000 preference ordinary and 1,000 ordinary shares of £1. Return dated September 5th, 1931 (filed May 13th, 1932). 960 preferred ordinary and 600 ordinary shares taken up. £1,060 paid on 960 preferred ordinary and 100 ordinary shares. £500 considered as paid on 500 ordinary shares. Mortgages and charges, £1,000.

Caersus Electric Supply Co., Ltd.—Capital, £2,300 in £1 shares. Return dated April 5th, 1932. 2,300 shares taken up. £2,300 paid. Mortgages and charges, nil.

Trent Valley & High Peak Electricity Co., Ltd.—Capital, £20,000 in £1 shares. Return dated May 19th, 1932. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Macintosh Cable Co., Ltd.—Satisfaction to the extent of £50,000 on August 15th, of 1st mortgage debenture stock authorised by resolution dated August 27th, 1930, and registered October 20th, 1930, securing £350,000.

Bower Electric (1926), Ltd.—P. J. Chaplin, 8, Staple Inn, W.C.1, ceased to act as receiver on August 22nd.

Midland Electric Manufacturing Co., Ltd.—Capital £187,500 in 75,000 preference and 112,500 ordinary shares of £1. Return dated March 8th, 1932. All shares taken up. £85,000 paid. £102,500 considered as paid. Mortgages and charges, nil.

Northants Electrical Installations, Ltd.—Capital £2,000 in £1 shares. Return dated May 29th, 1931 (filed April 18th, 1932). 1,920 shares taken up. £640 paid. £1,280 considered as paid. Mortgages and charges, nil.

Vabest Co., Ltd.—Satisfaction to the extent of £800 on August 5th of debentures authorised April 23rd, 1924, and registered May 7th, 1924. (According to the register of mortgages, the debentures registered May 7th, 1924, originally secured £3,000.)

Shrosbery Bakewell & Co., Ltd.—D. R. Evans, 29/30, King Street, E.C.2, was appointed receiver on August 18th under powers contained in debenture dated March 9th, 1931.

Van Raden & Co., Ltd.—Satisfaction to the extent of £1,850 on August 16th of mortgage dated August 15th, 1910, and registered August 25th, 1910. (According to the register of mortgages, the mortgage registered August 25th, 1910, originally secured £1,850.)

Majestic Distributors (Manchester), Ltd.—Satisfaction in full on August 15th of debentures authorised by resolution dated November 1st, 1930, and registered November 11th, 1930, securing £1,400.

Magstarlite, Ltd.—Debenture dated July 30th, to secure £150, charged on the company's property, present and future, including uncalled capital. Holder: Mrs. E. A. Frost, 16, Eland Road, S.W.11.

Electric Transmission, Ltd.—Capital £10,000 in £1 shares. Return dated February 19th, 1932. 5,000 shares taken up. £5,000 paid. Mortgages and charges, nil.

"Winkworth" Electric Car-Bells, Ltd.—Capital £100 in £1 shares. Return dated June 2nd, 1932. All shares taken up. £2 paid. £98 considered as paid. Mortgages and charges, nil.

Neglin Lamp Co., Ltd.—Capital £500 in £1 shares. Return dated May 19th, 1931 (filed April 2nd, 1932). 500 shares taken up. £500 paid. Mortgages and charges, nil.

City Notes

Kiesselbach Steam Accumulators.—The report for the year ended March 31st last states that plants erected in this country are working satisfactorily, but depressed conditions, particularly in the iron, steel and coal trades, are responsible for a lack of new business. The directors have decided to reduce operations considerably, and cut down expenses consistent with keeping the technical organisation running until business shows better prospects. Sole rights in the British Empire (excluding Canada) of the E.-H. Diesel engine fuel pump have been acquired. For this purpose a small subsidiary company, E.-H. Fuel Injection, was registered, and the company owns the whole of the shares. The directors expect favourable results from this acquisition. The accounts show a debit balance on development and profit and loss for the year of £11,650, increasing the total to £40,484. Meeting: To-day (Friday) at Bush House, Aldwych, W.C.

The London Nigerian Power Co. reports a gross revenue of £15,976 for the year ended February 29th last, and after deducting all charges there remains a profit of £6,602. Service of debenture stock absorbed £7,895, leaving a debit of £1,292, from which is deducted a balance brought forward, leaving a debit of £1,079 to be carried forward. No provision has been made for depreciation, &c. A further £20,000 of 7½ per cent. of first mortgage debenture stock has been issued, making a total of £121,387 in issue. During the year 4,238,558 kWh of electricity was sold, as compared with 4,895,952 kWh during the 13½ months covered by the previous accounts. Since the close of the company's financial year a more drastic curtailment of production has been decided upon by the tin mining companies, and as a result the demand for power will be reduced further and will reflect unfavourably upon the results for the current year.

Utilities Power & Light Corporation.—The quarterly report of the Corporation and its subsidiaries up to March 31st last discloses a gross consolidated revenue of $51,469,482, as compared with $51,574,143 in the previous quarter. The gross operating revenue for the year ended March 31st was $50,297,235 ($50,560,350) and the net income $4,294,367 ($4,645,893). In a statement of the consolidated earnings of the Greater London and Counties Trust and subsidiaries embodied in the report, the figures show little change from those reported for the calendar year. The net income before deducting fixed charges at March 31st was $6,587,562 ($6,544,191) and the total net income before providing for renewals and taxes amounted to $4,336,012 ($4,372,613).

Electrical and Musical Industries, Ltd.—A circular issued by the directors states that the financial year of the company's two principal subsidiary companies, the Gramophone Company and Columbia Graphophone Company, ends on June 30th, and it has been decided to fix the termination of the financial year of the holding company at September 30th, before which date, the directors state, it is impossible to ascertain the trading results of the group. An extension of time for the first accounts has been granted by the Board of Trade, and it is proposed that a formal meeting called for September 7th shall be adjourned. It is the desire of the directors to present the accounts as soon as possible after September 30th.

The Calcutta Tramways Co. has declared an interim ordinary dividend of 2½ per cent. There was no interim dividend in 1931, but 3½ per cent. was paid at the end of the year.

J. G. White & Co., Ltd., reports a trading loss of £12,155 for the year ended February last (against £2,602 in 1930-31). The total debit carried forward is £15,150.

The Globe Telegraph & Trust Co., Ltd., is paying an ordinary dividend of ½ per cent. for the past quarter. The last distribution on the ordinary shares was 1¾ per cent. for the June, 1931, quarter.

The Bergmann Company.—It is announced that out of the independent holders of 7,000,000 marks in the Bergmann Electricity Company, the owners of 6,750,000 marks have availed themselves of the purchase offer made by the A.E.G. and the Siemens-Schuckert Company, so that these two companies now control practically the whole of the capital. It is assumed that the companies will now soon decide the question as to whether to reorganise or liquidate the Bergmann Company.

The Pennsylvania Water & Power Co. is to hold a special meeting on October 24th to consider a resolution that the capital shall be increased from 540,000 shares without nominal or par value to 640,000 shares without nominal or par value, to consist of 540,000 shares of common stock and 100,000 shares of preferred stock. The increase is to be effected by the creation of 100,000 shares of preferred stock entitled to a cumulative preferential dividend of $5 per share.

The Buenos Aires Lacroze Tramways Co.—Meetings of the holders of the 5 per cent. extension mortgage debentures and the consolidated mortgage debentures will be held on September 15th at Winchester House to consider a scheme of arrangement modifying the rights of the holders of the two issues.

The Columbia Gas & Electric Co. and subsidiaries report a total revenue of $82,722,893 for the year ended June 30th last, as compared with $93,429,817 for the previous year. The net operating revenue was $26,921,408 ($30,981,194), and after deducting interest charges, &c., there was a balance of $18,530,661 ($24,010,387) applicable to capital stocks.

The Jerusalem Electric & Public Service Corporation records a profit of £20,724 for the twelve months ended March 31st last, as compared with £11,157 in 1930-31, £4,302 (£3,568) being carried forward. A sum of £5,000 (against nil) has been placed to general reserve.

The Bell Telephone Co. of Canada announces a quarterly dividend of 1¾ per cent. on class "A" shares.

The Brazilian Traction, Light & Power Co. has declared a quarterly dividend of 1½ per cent. on outstanding cumulative preference shares.

The Rangoon Electric Tramway & Supply Co. is to pay an interim dividend of 6 annas per share, free of Indian income tax, on the ordinary shares.

The British Columbia Power Corporation has maintained its usual quarterly dividend of 50 cents per share on class "A" shares.

Stocks and Shares

TUESDAY EVENING.

THE cheerful tendency in the Stock Exchange, to which attention was drawn here last week, continues in the ascendant. There can be no doubt as to the widening of interest amongst the general public in matters relating to stocks and shares. The gilt-edged issues have suffered to some extent competition from other, and more speculative, descriptions. A more cheerful feeling in the United States is reflected in rising prices, not only of stocks and shares, but of commodities and base metals. Rubber is materially better on the week, and in the metal markets, tin and copper have both been going ahead.

The result of the Ottawa Conference is held to be promising for business throughout the Empire. One effect is seen in a substantial recovery in the prices of cables and wireless stocks. A special meeting of the Cabinet was held at the end of last week. Amongst other subjects, the Government discussed the advisability of raising the embargo that has been placed upon new capital issues. The result of the deliberations was not entirely satisfactory to those interested in the early raising of fresh money.

Cables and Wireless

The principal feature in the list of British Government stocks and shares is a jump of 6 points in Cables and Wireless 5½ per cent. preference. This lifted the quotation to 73¼. Speculation argued that the "A" ordinary stock offers the greater scope for appreciation, and the price strengthened to 26, the "B" ordinary gaining 3 points at 13. It may be noticed, as a matter of curiosity, that £100 of each class of stock would now cost about £120, whereas, two or three months ago, £300 nominal would have been bought for a trifle under £50. It is easy enough to say that the previous prices were unduly depressed, but the fortunate few who picked up stock at the low levels then prevailing will probably feel that even to-day's quotations may be exceeded if the hopefulness in regard to Inter-Empire trade receives material justification. In company with the rises in Cables and Wireless stocks, Globe Telegraph & Trust ordinary are 30s. higher at 9¼, and the preference at 11 are 10s. up. Marconi Marines improved to 30s. The Anglo-American group is unchanged. American Telephone & Telegraph stock retains its very substantial rise at 167½, and International Telephones are strong at 18½.

Dollar Stocks

The Shawinigan Water & Power Company has declared a dividend of 25 cents for the past quarter, making 50 cents for the half year. The company announces a surplus of $1,670,000 for the first six months of this year, before making allowance for depreciation and income tax. The price of 23 is 2 points higher. Montreal Light & Power at 46¼ are 3¼ up. Consolidated Gas & Electric of Baltimore at 75 have risen 13¼. British Columbia Power "A" shares at 35 are 1½ to the good, and the "B" have gained ¾ at 9. President Hoover declared, a few days ago, that a "major financial crisis, unparalleled in the history of the world, has been successfully overcome." This statement has been widely quoted throughout both hemispheres, and has played an important part, there can be little doubt, in bringing hopefulness to the business world. A greater willingness to spend money in stocks, shares, commodities, and other things is becoming manifest all round.

There is nothing fresh to record in Mexican issues. The International Committee of Bankers on Mexico has filed a suit in the New York Supreme Court asking for permission to account for its work during the past ten years. The Com-

mittee represents holders of bonds of which a large number are held by British subjects. For some time past the Committee has been pressed to present its work of the past decade in the manner which it is now asked may be done.

Hydro-Electric " Tap "

New York came a substantial buyer of Hydro-Electrics, and it was said that a tap of 200,000 shares, which had been running for some time past, was finally turned off. At any rate, the support was sufficiently persistent to put up the price to 11¼. In sympathy, International Holdings, which had been languishing below 1 for months past, suddenly advanced to 2. Hydro preferred, which stand in front of the common shares, and which are in receipt of dividends, are quoted at 7, an anomaly for which there is little explanation other than the fact that in these shares the market is extremely limited, while in Hydro common shares there is a constant activity which irresistibly attracts the speculator.

Home Electricity Supply Shares

For once in a way there are a few falls to be recorded in the list of London Electricity Supply companies' shares. St. James' and Pall Mall have eased off to 31s., Westminsters to 32s. It is said that a deceased account has come to market, and that these shares form part of the estate. North Metropolitan Electric 6 per cent. preference are a little easier at 28s., and so are Midland Counties preference at 27s. Brompton ordinary and London Electric ordinary are both 6d. down. Newcastle & District ordinary are a little better at 28s. 9d. The Utilities Power & Light Corporation, controlling the Greater London & Counties Trust, which is largely interested in Edmundson's Electricity Corporation, the Shropshire, Worcestershire & Staffordshire Electric Power Company, and a number of others, has published a return of its operations, in which it is shown that the decline in revenue is less than might have been expected, having regard to the general conditions of trade. The net income shows a decline of $350,000. The company draws a large part of its earnings from the sale of electricity by its subsidiaries.

Newcastle-on-Tyne Electric ordinary shares are better at 25s. 9d. The company is paying dividends at the rate of 6 per cent. per annum. Amongst shares on offer in the market may be mentioned 5,000 Midland Electric Corporation for Power Distribution ordinary shares, which can be bought at 33s. 6d. The company has paid an annual dividend of 8 per cent. during the past four years, and there is a dividend due in October. At the present price the yield is £4 16s. per cent. on the money.

Home Railway Stocks

The Home Railway market is disposed to be dull. A timorous rise occurs every now and then, but is promptly quenched by stock that comes to market. Amongst the prior charge stocks, District 4½ per cent. preference is better at 90½, and the same railway's 4 per cent. guaranteed stock is a point higher at 84½. In the traction group, London & Suburban ordinary shares have risen 6d. to 1s. 3d., the 5 per cent. preference retaining their previous price of 9s. 6d. London General Omnibus income debenture stock reacted to 108. The possibility of a strike of busmen led to the price of Underground Electric ordinary shares easing off to 17s. 6d.

Manufacturing Equipment

Shares in the companies connected with the manufacture and sale of wireless plant have been in demand, owing to the satisfactory result of last week's Radio Exhibition at Olympia. Business has been brisk. The companies concerned in the Exhibition appear to be well satisfied with the effort, and with the prospect that opens for the winter season. Ever-Ready shares are better at 26s. E. K. Cole ordinary have hardened to 17s. The company's 7 per cent. preference shares, redeemable at 22s. in 1958, look attractive at 18s. 9d. The Electrical and Manufacturing group is also firm. The principal feature is a rise of 5s. in Enfield Cable ordinary. The price is now 4½, and it is understood that a parcel of shares which had recently been overhanging the market is fully absorbed. Callender's rose to £3. Henley's keep steady at 5 15/16. British Insulated ordinary at 63s. 9d. are 1/16 better. The rise in the price of rubber has brought about a sharp improvement in rubber shares.

Miscellaneous Movements

Telegraph Constructions have risen to 10½, and Callender's Share & Investment Trust debenture stock is better at 107½, Amongst Colonial and foreign issues, East African Light & Power at 28s. 3d., Madras Electric Supply at 30s., and Lisbon Trams at 18s. are all harder. Perak River Hydro-Electric ordinary came into demand, and rose to 1s. 9d., the 7 per cent. debenture being advanced 7 points to 34½. On the other hand, Tokyo sixes receded to 67½, in consequence of the adverse movements in the Japanese rate of exchange. Buenos Aires Lacroze debenture has lost several points at 40. Chadburn's Ship Telegraph ordinary shares are nominally 1s. 9d. down at a florin, and the preference gave way to 7s. 6d. Cuban Telephone first mortgage bonds at 80 are marked up 5 points. Electric & Musical Industries shares jumped to 18s. at seven o'clock in the street market on Monday night, reacting to 16s. 6d. on the following day.

Iron and steel shares have participated in the advance amongst industrials. Babcocks at 45s. are 6d. up, and Vickers at 7s. 3d. show a gain of ninepence.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. Aug. 30.	Rise. or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/-	—	4 5 9
Brompton Ordinary	1	8½	8½	31/6	- 6d.	4 9 0
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/-	—	4 7 6
Chelsea	1	8½	8½	32/-	—	4 7 6
City of London	1	10	10	42/6	—	4 14 1
Clyde Valley	1	8	7	30/-	—	4 13 4
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/-	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	38/3	—	4 14 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	33/-	—	4 4 10
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/-	—6d.	4 7 6
Metropolitan	1	10	10	45/-	—	4 9 0
Midland Counties	1	7	7	32/6	—	4 6 2
Mid. Elec. Power	1	8	8	33/3	—	4 16 9
Newcastle-on-Tyne Ordinary	1	6	6	25/9	+9d.	4 13 2
Do. 7% Pref.	1	7	7	31/-	—	4 10 4
Northampton	1	10	10	45/-	—	4 9 0
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/-	—6d.	4 5 9
St. James' and Pall Mall	1	8	8	31/-	—1/-	4 10 4
Scottish Power	1	8	—	32/6	—	4 18 6
South London	1	8½	8½	33/-	—	4 10 0
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	32/-	—6d.	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	37/-	—	4 6 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	81½	—	4 18 2
Metropolitan	1	3½	2½	60	—	4 3 4
Do. District	1	5	4½	58½	—	7 13 10
Underground Electric	1	8	7	17/6	—6d.	8 0 0
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	167½	—	5 7 6
Anglo-Am. Tel. Pref.	Stock	6	6	102½	—	5 17 1
Do. Def.	„	1½	1½	24	—	6 5 0
Cables & Wireless 5½% Pref.	„	5½	2½	73½	+6	3 14 10
Do. A 7½% Ord.	„	—	Nil	26	+2	—
Do. B Ord.	„	—	Nil	13	+3	—
Globe Tel. and T. Ord.	10	8½	Nil	9½	+1½	—
Do. do. Pref.	10	6	6	11	+½	5 14 3
Great Northern Tel.	10	20	20	25½	—	7 17 0
Marconi-Marine	1	15	10	30/-	+6d.	6 13 4
Oriental Telephone Ord.	1	12	12	2½	—	*4 16 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/9	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	„	5	5	300	—	—
Do. do. Pref. Ord.	„	8	8	133½	—	5 19 10
Brazil Traction	100	—	—	14½	+1½	—
Brit. Columbia Elec. Rly. Pfd.	Stock	5	5	99½	—	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	9/6	—	—
London United Tram Deb.	Stock	4	4	61½	—1	6 10 0
Mexico Trams, 5% Bonds	—	5	5	29½	—	16 19 0
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	54½xd.	—	9 2 0
Victoria Falls Ord.	1	15	15	68/9	—	4 7 3
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	15	14	45/-	+6d.	6 4 5
British Aluminium Ord.	1	10	5	24/6	—	4 1 8
British Insulated Ord.	1	15	15	63/9	+1/-	4 14 0
Brush Ord.	Stock	5	Nil	40	—	—
Callender's	1	15	15	3	+½	5 0 0
Do. 6½% Pref.	1	6½	6½	27/6	—	4 14 8
Crompton Parkinson Ord.	5/-	30	24	18/9	—	6 7 8
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st. Pref.	1	7½	7½	23/3	—	6 9 4
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	4½	+½	6 1 3
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/-	35	35	26/-	+3d.	6 14 7
Ferranti Pref.	1	7	7	23/9	—	5 18 0
G.E.C. Pref.	1	6½	6½	28/-	—	4 12 10
Do. ord.	1	10	8	42/-	—6d.	3 16 2
Henley's	1	30	30	5⅞	—	5 1 1
Do. 4½ Pref.	5	4½	4½	4½xd.	—	4 12 4
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	¾	—	5 14 3
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10½	+½	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

2446. "Electric cables." P. H. Chase. January 25th, 1930. (377989.)

3023. "Telephone repeaters." Kings Patent Agency, Ltd. (J. P. Loewe). January 30th, 1931. (377958.)

10092. "Device to prevent lag of spark between electrodes." J. Bader. April 2nd, 1931. (378059.)

10115. "Electrically heated glass annealing lehrs." British Hartford-Fairmont Syndicate, Ltd. April 5th, 1930. (378015.)

12299. "Transmission of electric power." British Thomson-Houston Co., Ltd. April 25th, 1930. (378062.)

12491. "Combined telegraph and telephone exchange systems." Standard Telephones & Cables, Ltd., A. M. Searle, G. L. Hunt, and R. J. M. Andrews. April 28th, 1931. (Cognate application 19461/31.) (378064.)

12516. "Systems of electrical regulation." British Thomson-Houston Co., Ltd. April 29th, 1930. (377999.)

12680. "Method of and apparatus for electrical control of electromagnetic interrupters." Safety Car Heating and Lighting Co. April 30th, 1930. (378065.)

12734. "Automatic telegraph switching system." International Communications Laboratories Inc. July 23rd, 1930. (377965.)

12760. "Wireless transmitters and receivers." W. B. Mackenzie, J. C. W. Drabble, and R. A. Yeo. April 30th, 1931. (377967.)

12761. "Electric telegraph and like signalling systems." Electrical Research Products Inc. April 30th, 1930. (377968.)

12793. "Clamps for electric cables." Bullers, Ltd., and J. G. Miller. April 30th, 1931. (378021.)

12795. "Electric controlling and/or signalling installations, more particularly for railways." General Railway Signal Co. May 24th, 1930. (377971.)

12799. "Telephone and like systems." Associated Telephone and Telegraph Co. June 27th, 1930. (377973.)

12835. "Electric protective cut-out arrangements." Westinghouse Electric & Manufacturing Co. May 1st, 1930. (377975.)

12857. "Electric thermal storage heating systems." V. Z. de Ferranti and Ferranti, Ltd. May 1st, 1931. (377976.)

12867. "Thermionic switching system." Communication Patents Inc. October 4th, 1930. (378023.)

12878. "Light valves for use in sound recording and picture transmission or like systems." Electrical Research Products Inc. May 14th, 1930. (377977.)

12884. "Fault responsive electric protective systems." Westinghouse Electric & Manufacturing Co. May 11th, 1930. (378037.)

12912. "Protective arrangements for alternating current polyphase power transmission systems." R. O. Kapp, C. G. Carrothers, and General Electric Co., Ltd. May 1st, 1931. (Cognate application 22605/31.) (378006.)

12923. "Radio-electric musical instrument with keyboard and thermionic valves." E. E. Coupleux and J. A. V. de P. Givelet. May 28th, 1930. (Addition to 359967.) (378068.)

12924. "Radio-electric musical instrument with keyboard and thermionic valves." E. E. Coupleux and J. A. V. de P. Givelet. November 15th, 1930. (Addition to 359967.) (378069.)

12925. "Radio-electric musical instrument with keyboard and thermionic valves." E. E. Coupleux and J. A. M. de P. Givelet. May 1st, 1930. (Addition to 359967.) (378070.)

12927. "Electrical switchgear." D. R. Davies, J. Swinney, and Associated Electrical Industries. May 1st, 1931. (378007.)

13104. "Electric or other heaters." C. W. Joy. May 4th, 1931. (378027.)

13115. "Wireless receiving apparatus." A. K. Gordon. May 4th, 1931. (378028.)

13291. "Eddy current track braking apparatus." Ges. für Oberbauforschung und Rangiertechnik Ges. May 13th, 1930. (Addition to 33939/30.) (378047.)

13402. "Electric discharge devices." British Thomson-Houston Co., Ltd. May 29th, 1930. (378076.)

13419. "Radio-frequency signalling systems." P. P. Eckersley. May 6th, 1931. (378077.)

13442. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett, and N. Levin. May 6th, 1931. (378079.)

13506. "Step-by-step switches such as are used in automatic telephone systems." Standard Telephones & Cables, Ltd., C. P. Smith, and G. Newton. May 7th, 1931. (378081.)

13507. "Telephone systems." Standard Telephones & Cables, Ltd. (G. Deakin and R. D. Spann). May 7th, 1931. (378082.)

13658. "Electric telegraph systems." Imperial & International Communications, Ltd., and H. V. Higgit. May 8th, 1931. (378090.)

13880. "Apparatus for administering high-frequency current for curative purposes." Savory & Moore (1928), Ltd., and C. Yeo. May 11th, 1931. (378103.)

13888. "Electrical signalling apparatus." General Electric Co., Ltd., and R. C. Walker. May 11th, 1931. (378104.)

13916. "Time switches." C. G. H. Hallett and Morgan Crucible Co., Ltd. May 11th, 1931. (Cognate application 7213/32.) (378105.)

14538. "Electric accumulator for all applications, and particularly for utilisation on automobiles." Soc. Anon. des Accumulateurs Monoplaque. May 16th, 1930. (378116.)

14654. "Means for adjustably mounting electric switches and the like." General Electric Co., Ltd., and J. H. Collings. May 18th, 1931. (378118.)

15397. "Vacuum tubes and cathode structures therefor." British Thomson-Houston Co., Ltd. May 24th, 1930. (378126.)

18054. "Electrical systems for the excitation of dynamo-electric machines." E. M. Johnson and Associated Electrical Industries, Ltd. June 22nd, 1931. (378146.)

18185. "Electric couplings." General Electric Co., Ltd., and W. Harrison. June 23rd, 1931. (378150.)

18536. "Switch mechanism as used in automatic telephone and like selective systems." Siemens Bros. & Co., Ltd., and E. J. Gachet. June 26th, 1931. (378154.)

18894. "Electric switchgear." British Thomson-Houston Co., Ltd. June 30th, 1930. (378163.)

19945. "Motor converters." R. Townend and Associated Electrical Industries, Ltd. July 10th, 1931. (378169.)

20140. "Dynamo-electric machines." Siemens-Schuckertwerke Akt.-Ges. July 12th, 1930. (378173.)

20323. "Electric discharge devices." General Electric Co., Ltd., H. G. Jenkings, and J. W. Ryde. July 15th, 1931. (378178.)

20857. "Control systems for electrical apparatus as motors." S. Gowan, F. G. Ferguson and Associated Electrical Industries, Ltd. July 21st, 1931. (378180.)

21399. "Terminal plates or strips and terminals therefor." Belling & Lee, Ltd., and E. M. Lee. July 27th, 1931. (378,187.)

21400. "Wander-plug and like terminals." Belling & Lee, Ltd., and E. M. Lee. July 27th, 1931. (378188.)

23714. "Circuit arrangement for the operation of electrostatic loud speakers in connection with amplifying and rectifying arrangements." H. Vogt. August 24th, 1931. (378212.)

24457. "Battery clamp." R. L. Parish. July 11th, 1931. (Addition to 20704/30.) (378224.)

27025. "Loud speakers." Ideal Werke Akt.-Ges. für Drahtlose Telegraphie. July 18th, 1931. (378244.)

27253. "Devices for extinguishing a.c. arcs in 'expansion' switches." Siemens-Schuckertwerke Akt.-Ges. November 8th, 1930. (378246.)

27871. "Apparatus for automatic production and transmission of telegraphic or radio-telegraphic signals." J. E. M. Detruiseux. October 8th, 1930. (378251.)

28012. "Method of manufacturing commutator segments." Ford Motor Co., Ltd. January 19th, 1931. (378253.)

28333. "Thermionic amplifiers." Marconi's Wireless Telegraph Co., Ltd. October 11th, 1930. (378256.)

28968. "Telephone circuits." G. W. Pearson. January 28th, 1931. (378260.)

29763. "Electric motor controllers." Igranic Electric Co., Ltd. October 27th, 1930. (378265.)

29778. "Electric dynamic sound reproducing devices." L. W. Murkham and D. T. Bennett. October 27th, 1931. (378266.)

30199. "Electric switches of the type wherein the make-and-break contact elements are arranged to be separated beneath the surface of a liquid." Siemens-Schuckertwerke Akt.-Ges. December 19th, 1930. (378269.)

32973. "Loud speakers." H. L. Kirke, A. B. Loewe, and A. E. Barrett. November 27th, 1931. (378286.)

33058. "Series parallel control of compound wound motors for electric traction with regenerative braking." L. Bacqueyrisse. December 3rd, 1930. (378287.)

33428. "Metallic-vapour rectifiers." Siemens-Schuckertwerke Akt.-Ges. January 28th, 1931. (378293.)

34209. "Dimmer switches for motor cars, motor cycles and bicycles." Scintilla Akt.-Ges. January 2nd, 1931. (378298.)

34258. "Drying electric condensers." Telefonaktiebolaget L. M. Ericsson. June 9th, 1931. (378299.)

34999. "Apparatus for measuring electric resistances." Siemens and Halske Akt.-Ges. February 9th, 1931. (Addition to 288288. (378305.)

1932

728. "Electrical connectors of the plug-and-socket type." C. L. Arnold and M. K. Electric, Ltd. January 9th, 1932. (378312.)

2220. "Arrangement for the driving of a weaving loom by individual electric motor." Ateliers Diederichs. January 26th, 1931. (378323.)

2349. "Electrical apparatus for heating and cooking." G. Halliday. January 26th, 1932. (378326.)

3864. "Electric lamps." General Electric Co., Ltd. February 23rd, 1931. (378333.)

4253. "Trolley for electrically driven vehicles." G. Paille Regnac. November 20th, 1931. (378338.)

5464. "Electrical starting motors for internal combustion engines." R. Bosch Akt.-Ges. June 13th, 1931. (378343.)

7531. "Radio and other high-frequency circuit arrangements." Marconi's Wireless Telegraph Co., Ltd. March 13th, 1931. (378350.)

9804. "Turbo-generator installations." G. R. Shepherd (Westinghouse Electric & Manufacturing Co.). April 5th, 1932. (378361.)

11841. "Telemetering apparatus." British Thomson-Houston Co., Ltd. April 24th, 1931. (378366.)

15271. "Electric impedance-responsive relays." Westinghouse Electric & Manufacturing Co. May 1st, 1930. (Divided application on 12835/31.) (378029.)

15273. "Electric time element relays." Westinghouse Electric & Manufacturing Co., Ltd. May 1st, 1930. (Divided application on 12835/31.) (378048.)

15316. "Loud speakers." British Thomson-Houston Co., Ltd. May 28th, 1931. (378371.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 24th :—

Coll-Ace (lettering and design). No. 533,349. Class 6. Portable, electrically-driven grinding machines. Amy M. Collins (A. M. Collins & Co.), 63, Farringdon Street, E.C.4.

Zonovisor. No. 531,387. Class 8. Apparatus for use in transmitting images or scenes and/or sounds to a distance by telegraphy and telephony. Baird Television, Ltd., 133, Long Acre, W.C.2.

Trouton (lettering and design). No. 532,285. Class 8. Loud-speakers. Loud Speaker Engineering Co., Ltd., Great Western Street, Aylesbury.

Intertherm. No. 532,396. Class 11. Electrical apparatus (not medical) for use in medical diathermy. Stanley Cox, Ltd., 39, Gerrard Street, W.1.

Stesco. No. 532,578. Class 13. Electric lamps, etc. I. & M. Steiner, Ltd., 15-16, Bartholomew Close, E.C.1.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Pavilion, Marine Parade (£15,000); borough engineer.

Alnwick.—Houses, Shilbattle, for the R.D.C.; E. J. Clarkson, architect, Council offices.

Ardsley (YORKS).—Houses (50); U.D.C. surveyor.

Barnsley.—Extension of the casual wards at the Institution; C. F. Moxon, architect, 3, Regent Street S.

Bexley.—Houses (300), Long Lane, Bexley Heath, for F. R. Absalom. Houses (866), Welling, for J. Stevens & Sons. Houses (44), Penhill Road, for D. C. Bowyer. Bank, Welling, for Barclay's Bank, Ltd.

Billingham-on-Tees.—Nurses' home; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Birkenhead.—Church, Higher Bebington; Methodist Churches Sites Committee.

Birmingham.—Premises, Broad Street, for the B.B.C.; P. Hing, architect, 121, Colmore Row. Reconstruction of works for T. W. Lench, Ltd., Blackheath (£30,000 to £40,000).

Blean (KENT).—Houses (20), Sturry, for the R.D.C.; C. Hawkes, builder.

Bournemouth.—Extensions, Church of Corpus Christi, Boscombe (£12,300); F. Hoare & Sons, builders, Westbourne.

Brighton.—St. Wilfrid's Church; H. S. Goodhart-Rendel, architect, 60, Tufton Street, London, S.W.

Buckie (ABERDEEN).—Bakery, West Church Street, for William Young, Moray Firth Bakery.

Bucklow.—Development of nine acres, Chapel Lane, Ringway; E. R. Clibran.

Cambridge.—Extensions, Addenbrooke's Hospital (£22,690); John Brignell, builder, Newmarket Road.

Cardiff.—Buildings, Lansdowne Road; Franklin Thomas & Co. Reconstruction of Butchers Arms, Heol-y-felin, Rhiwina; licensee.

Carlisle.—Premises, Gaol site, for F. W. Woolworth, Ltd.; Woolworth's Constructional Department, Liverpool.

Chesterfield.—Houses (22), St. Augustine's Estate; H. Clayton, architect, 12, Corporation Street.

Cudworth (YORKS).—Houses (20); J. A. Haigh, U.D.C. surveyor.

Dagenham (ESSEX).—R. C. Schools; F. H. B. Scott, architect, A. Saunders, builder, Brentwood.

Darvel (AYRSHIRE).—Factory extensions, for Cleland Bros. & Co., Ltd., Fleming Street.

Doncaster.—Rehousing scheme (78); borough surveyor.

Dorchester.—Cinema, Trinity Street, with electrical work, for a local company; J. G. Woods, managing director, Portsmouth.

Dunfermline.—Business stores, Bellyeoman housing site; Townhill Industrial Co-operative Society, Ltd.; secretary.

Ealing.—Enlargement and completion of St. Benedict's Church; Boyd & Murley, Ltd., builders, Reading.

East Sussex.—Nurses' home (£9,650), Steyning; county architect.

Esher.—Estate development, Arterial road; E. & L. Berg, of Hinchley Wood Estate.

Fleetwood.—Houses (100), Flakefleet Estate; U.D.C. surveyor.

Glasgow.—Bus station for Scottish Motor Traction Co; 113-115, Buchanan Street. Houses (188), for Western Heritable Investment Co.; J. Wilson, architect, 141, Bath Street. Substation at factory for Cooper & Co.'s Stores, Ltd., 8-38, Howard Street; the manager. Houses, Holmlea Road (216) and Cumlodden Drive (120); city engineer.

Gloucester.—Re-erection of incubator works; Hempstead Lane, for H. W. Stephens (£25,000).

Guildford.—Building estate, Leatherhead-Guildford road; Horseley Estates, Ltd. Development, Dedswell Manor Estate, London-Portsmouth main road; J. A. Fogwill.

Haddington (EAST LOTHIAN).—Cinema, Hardgate; R. Scott, architect, Tyne House.

Hereford.—Rebuilding premises, High Street; Huttons, Ltd.

Huddersfield.—Houses (20), St. Andrew's Road; borough engineer. Club premises, for Linthwaite Conservative Club; C. F. Mallinson & Son, architects, Market Place. Rebuilding the White Lion Inn; S. Johnson & Son, builders, Mirfield. Rebuilding the Swan with Two Necks; Abbey & Hanson, architects, Cloth Hall, Huddersfield.

Irish Free State (CORK).—Houses (251), Griffins Field, Blarney Street; J. R. Boyd Barrett, architect, 61, South Mall. (NORTH TIPPERARY).—Hospital; County Board of Health, Thurles. (TULLAMORE, KING'S CO.).—Hospital for the County Board of Health. Houses (42), Rapp Road; for the U.D.C.

Knutsford.—Development of 122 acres, Bucklow Hill; Mere New Gall Estates.

London (LEYTON).—Schools, Connaught Road, Leytonstone; director of education.

Macclesfield.—Additions to Royal Depôt Mills.

Meir (STAFFS).—Church; Longton United Methodist Circuit.

Middlesbrough.—Dairy premises for the Co-operative Society, Ltd., Clifton Street.

Nantwich.—Hotel, Nantwich-Newcastle main road; Peter Walker & Son.

Newcastle-on-Tyne.—Premises in Percy Street, for the P.C.H.A. (£25,000); J. R. Rutherford & Sons, builders, Jesmond, Newcastle. Modern flats and shops, Seatswood; Kirk & Dickinson, builders, New Bridge Street.

Newmarket (CAMBS).—Houses (50); R.D.C. surveyor.

Nottinghamshire.—Improvements to county mental institution (£5,400) and new schools, Arnold (£25,000); county architect.

Nuneaton.—Re-erection of factory, Attleborough Road, for the Nuneaton Wool & Leather Co. (£15,000).

Ormskirk (LANCS).—Canning factory; Alderman Rosbotham.

Pickering (YORKS).—Houses (32) for the U.D.C.; Henry Smith, architect, 36, Burgate.

Rainford (LANCS).—Houses (50) for the U.D.C.; Daniel Cooper, builder, Clarence Street, Warrington.

Runcorn.—Rehousing, Halton Road improvement scheme; R.D.C. surveyor.

St. Albans.—Re-erection of premises, including battery shop, for Giffens, Ltd., electrical and radio engineers, Chequer Street.

South Shields.—Ice-cream factory; J. Spraggon, builder, Tyne Dock, South Shields.

Stockton-on-Tees.—New premises for James Woodhouse and Son; Glass, Harrison and Ash, 20, Saville Row, Newcastle.

Swansea.—Stores, Oxford Street, for W. Edwards (Swansea), Ltd.; H. Billings & Son, builders, Trafalgar Yard.

Timperley.—Estate development off Wash Lane; Suburban Building Co.

Uppingham.—Houses (20); R.D.C. surveyor.

Walsall.—Houses (20), Well Lane; R. C. Griffiths.

Warwickshire.—Isolation hospital accommodation; county architect, Warwick. Grammar school, Coleshill; governors and county architect.

Yeovil.—Houses (20) for the R.D.C.; Petter & Warren, architects, Old Sarum.

Wrexham.—Re-erection of motor body building works, Gresford, for J. H. Crump.

Small Hydro-electric Power Stations in India

ON the slopes of the Himalayas in Northern India, at altitudes of 4,000 and 6,000 ft. respectively, two interesting hydro-electric power stations have been installed. In order to operate the first station, water is collected from two small streams and run into a cement-plastered lime-concrete flume at the rate of approximately 21 cu. ft. per second. The flume delivers into a forebay situated at a vertical height of 740 ft. above the station, whence a single 18-in. welded steel pipe carries the water to the Pelton wheels below.

This power station is constructed entirely of corrugated galvanised iron sheets and from a distance has the appearance of a shed. Inside are installed Pelton wheels of Messrs. Boving & Co.'s manufacture directly coupled to alternators. There are two sets, each rated 600 kVA at 3,300 V, 3-phase, 0.75 power factor, and 50 cycles per second. In the case of the second power station a masonry flume, similar to the first, but about 4,100 ft. long, conveys the water from an entirely different stream to a cement-concrete forebay situated at approximately 90 ft. above the station. From there a 2 ft. 6 in. riveted steel pipe takes it on to the station below; the rate of flow in the pipe is 75 cu. ft. per second. This station is constructed entirely of wood and contains one Francis turbine directly coupled to a 3-phase, 400-V, 50-cycle per second 648-kVA alternator.

Transformers of the open-air type are installed at both stations to step up the generated current to 1,100 V. The stations are about eight miles apart, and they are connected by a 1,100-V transmission line. Wooden "H" poles are used and the section of conductor mostly employed is No. 5 s.w.g., except where spans exceed 2,000 ft., when 7/.104 copper-clad steel cable is used and carried on short steel towers. The transmission line is protected by two galvanised steel wires, and the structures supporting the line are effectively earthed. The line is obliged, at one spot, to cross a mountain side at an altitude of 8,000 ft., and at this point a set of oxide-film lightning arresters is installed.

The capital and generating costs of these power stations, in Indian currency, are as follows:—

CAPITAL OUTLAY.

	1st Power Station.	2nd Power Station.
Capacity (kW)	900	480
Head works, flume and forebay ...	Rs. 164,005	Rs. 147,492
Pipe lines	Rs. 71,308	Rs. 27,900
Power station building, generating plant, transformers and transmission	Rs. 147,084	Rs. 90,834
Totals	Rs. 434,592	Rs. 308,030

GENERATING COSTS.

	1st Station.	2nd Station.
Peak load	600 kW.	480 kW.
Capital cost	Rs. 434,592	Rs. 308,030
Depreciation at 10 per cent. ...	Rs. 43,459	Rs. 30,803
Interest at 5½ per cent.	Rs. 23,902	Rs. 16,941
Annual operating cost	Rs. 20,400	Rs. 75,000
Total annual generating costs ...	Rs. 130,778	Rs. 55,244
Equivalent cost per kWh generated on a 50 per cent. load factor basis	0.4 pies	5 pies.

At the present rate of exchange, 13.5 rupees approximately is equivalent to one pound sterling and there are 192 pies in one rupee. These power stations have now been operating quite satisfactorily for over three years.—I. E. PETERSON, A.M.I.E.E.